N00217.003662
HUNTERS POINT
SSIC NO. 5090.3

5090
Ser 62210LT/L8028
27 Oct 1997

From: Commanding Officer, Engineering Field Activity, West, Naval Facilities Engineering Command
To: Distribution

Subj: PARCEL E DRAFT FINAL REMEDIAL INVESTIGATION REPORT, ENGINEERING FIELD ACTIVITY, WEST, NAVAL FACILITIES ENGINEERING COMMAND, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Encl: (1) Parcel E Remedial Investigation, Draft Final Report, Hunters Point Shipyard San Francisco, CA, dated 27 October 1997, Volumes I through III and various inserts

1. Enclosure (1) is forwarded in accordance with the Hunters Point Shipyard Federal Facilities Agreement. Please review this enclosure and provide your written comments to the Commanding Officer, Engineering Field Activity, West, Naval Facilities Engineering Command, (Attn: Mr. Richard Powell, Code 6221), 900 Commodore Drive, San Bruno, California 94066-5006, with a copy to Ms. Luann Tetirick, Code 62210.

2. Volumes I through III of enclosure (1) replaces the corresponding volumes of the Draft Parcel E Remedial Investigation (RI) Report dated 29 May 1997. However, only portions of Appendices C, F, G, J, N, O, P, and Q have been revised. Rather than reissuing the entire document, inserts have been provided for the revised portions of those Appendices. Please replace the appropriate pages from the Draft Parcel E RI Report with these attached inserts. The following appendices have been added: Appendix R, Installation Restoration (IR) Site 36, and Appendix S, Responses to Agency Comments.

3. Revisions to Appendix E and the Navy's responses to comments on that appendix have not been included in enclosure (1). The revisions to this appendix have been delayed for Navy review, but should be issued in approximately three weeks.

4. If you have any questions regarding enclosure (1), please contact Ms. Luann Tetirick at (650) 244-2561, FAX (650) 244-2654.

Original signed by:

for RICHARD E. POWELL mm
By direction of
the Commanding Officer

Distribution:
U.S. Environmental Protection Agency (Attn: Ms. Claire Trombadore)
U.S. Environmental Protection Agency (Attn: Ms. Sheryl Lauth)
California Department of Toxic Substances Control (Attn: Mr. Chein Kao)
California Department of Toxic Substances Control, Health & Ecological Risk Division (Attn: Dr. Jim Polisini)
California Regional Water Quality Control Board (Attn: Mr. Richard McMurtry)

5090
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27 Oct 1997

Subj: PARCEL E DRAFT FINAL REMEDIAL INVESTIGATION REPORT, ENGINEERING FIELD ACTIVITY, WEST, NAVAL FACILITIES ENGINEERING COMMAND, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Copies to:
Roy F. Weston, Inc. (Attn: Ms. Karla Brasaemle)
Department of Public Works, Site Assessment and Remediation Div. (Attn: Mr. John Chester)
Department of Public Works, Bureau of Construction Management (Attn: Mr. Steve Mullinnix)
Kern Mediation Group (Attn: Mr. Douglas Kern)
RAB Member: ARC Ecology (Attn: Ms. Christine Shirley)
NAVSEA DET RASO (Attn: LCDR Lino Fragoso)
NAVSHIPYD Pearl Harbor (Attn: Code 105.5, Anson Urabe) (Volumes 1-3, Appendices O, P)
Tetra Tech EMI (Attn: Mr. Jim Sickles, w/o encls)

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RF
Chron File: L8028LT.DOC (ab)
Activity File: HPS

N00217.003662
HUNTERS POINT
SSIC NO. 5090.3

DRAFT FINAL REPORT
PARCEL E REMEDIAL INVESTIGATION

DATED 27 OCTOBER 1997

THIS REPORT CONTAINS VOLUMES I THROUGH III, XXVIII, REVISED APPENDIX E AND VARIOUS INSERTS TO CONVERT DRAFT REPORT PARCEL E REMEDIAL INVESTIGATION DATED 29 MAY 1997 INTO DRAFT FINAL. VOLUMES I THROUGH III REPLACES THE CORRESPONDING VOLUMES OF THE DRAFT REPORT. VOLUME XXVIII HAS BEEN ADDED. REVISED APPENDIX E AND VARIOUS INSERTS HAVE BEEN PROVIDED FOR THE REVISED PORTIONS OF THE APPENDICES.

VOLUME I IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003663**

VOLUME II IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003664**

VOLUME III IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003665**

VOLUME XXVIII IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003666**

REVISED APPENDIX E IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003672**

DRAFT FINAL PARCEL E REMEDIAL INVESTIGATION REPORT
ASSEMBLY INSTRUCTIONS

VOLUME I

From the draft report, please remove the following items and insert them in the appropriate locations in the draft final binder:

1. Figure ES-1 (2 sheets)
2. Figures 1.3-1 through 1.3-4 (please note Figure 1.3-3 is 2 sheets)
3. Figures 3.1-1, 3.4-1, 3.5-1, 3.6-1, 3.7-7, 3.7-8 (2 sheets), 3.7-10, 3.7-11, 3.7-13, 3.7-15, 3.8-1, 3.8-2, and 3.10-1

VOLUME II

No substitutions are necessary.

VOLUME III

1. From the draft report, please remove Figures 5.1-1A through 5.1-1C and Figure 5.1-2 (2 sheets) and insert them into the draft final binder after the text and tables for Section 5.

2. From the draft report, please remove the tables and tabs for Section 4 and 4.1 (from the back of the binder) and insert them into the draft final binder after the references.

3. Replace Tables 4.1-40 and 4.1-41 from the draft report with Tables 4.1-40A, 4.1-40B, 4.1-41A, and 4.1-41B, which have been added to the draft final report. These tables are provided in the back of Volume III following the references..

VOLUMES IV through X

Replace covers of the draft report with the provided covers for the draft final report.

VOLUME XI

1. Replace covers of the draft report with the provided covers for the draft final report.
2. Insert Figures 4.2-7, 4.3-4, 4.4-6, 4.5-6, 4.6-6, 4.7-4, and 4.8-4, which have been added to the draft final report.

VOLUME XII

1. Replace covers of the draft report with the provided covers for the draft final report.
2. Replace Figures 4.22-1, 4.24-1, 4.25-1, and 4.27-1 with the attached revised figures.
3. Insert Figures 4.9-6, 4.10-6, 4.11-4, 4.12-4, 4.13-4, 4.20-3, 4.22-4, 4.23-4, 4.24-4, 4.26-4, 4.27-4, 4.27-5, and 4.27-6, which have been added to the draft final report.

VOLUME XIII

1. Replace covers of the draft report with the provided covers for the draft final report.
2. Replace Appendix C with the attached revised Appendix C.

VOLUME XIV

1. Replace covers of the draft report with the provided covers for the draft final report.
2. Replace the text of Appendix F with the attached revised Appendix F.
3. Replace Appendix G with the attached revised Appendix G.
4. Replace the first 20 pages of Appendix J with the attached revised pages. These pages consist of introductory text and the index of boring logs.

VOLUMES XV through XVIII

Replace covers of the draft report with the provided covers for the draft final report.

VOLUME XIX

1. Replace covers of the draft report with the provided covers for the draft final report.
2. Replace the text of Appendix N with the attached revised Appendix N.

VOLUMES XX through XXV

Replace covers of the draft report with the provided covers for the draft final report.

VOLUME XXVI

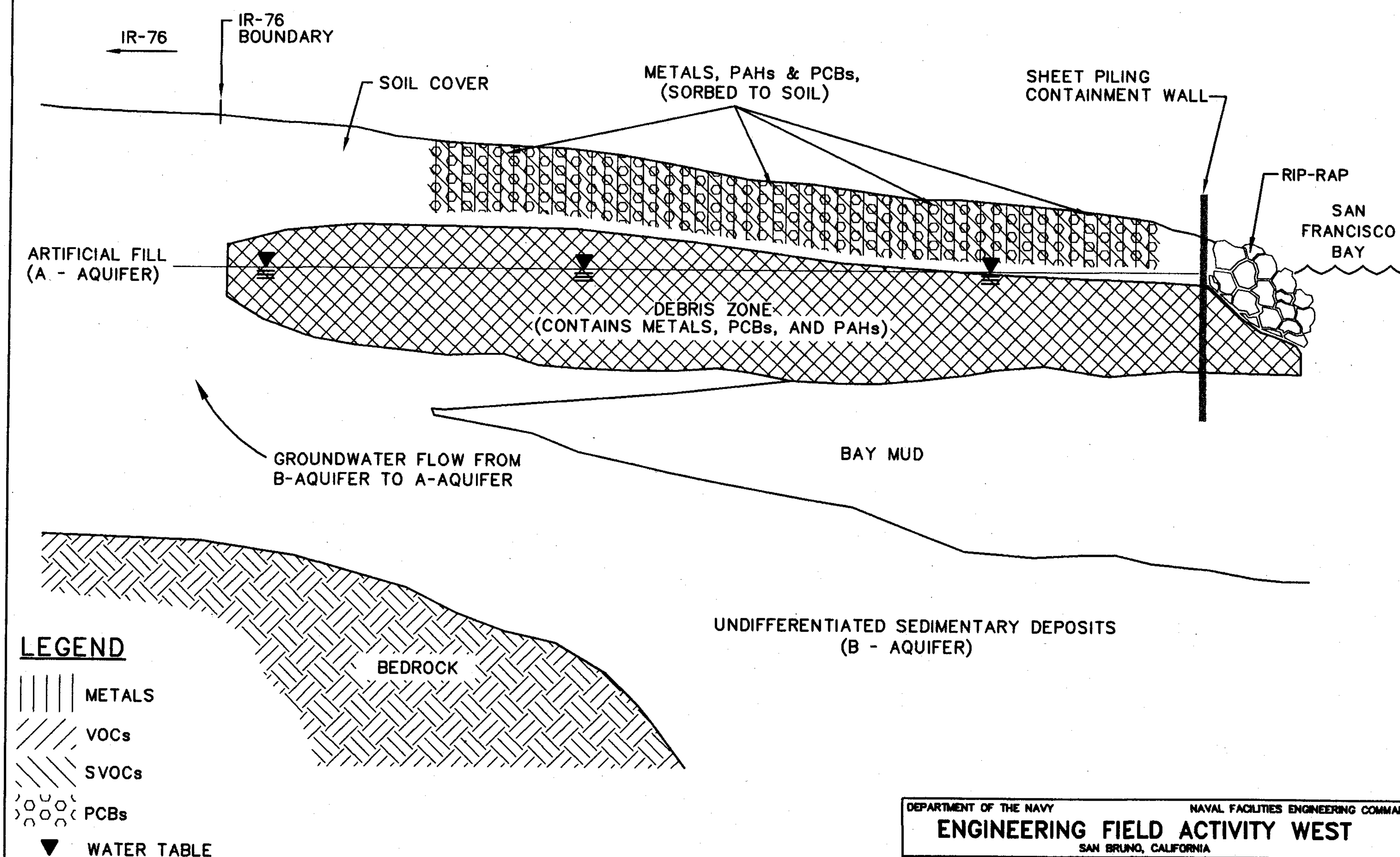
1. Replace covers of the draft report with the provided covers for the draft final report.
2. Replace the text of Attachment N-J with the attached revised text of Attachment N-J.
3. Replace Appendix O with the attached revised Appendix O.
4. Replace two pages of Appendix P with the attached revised pages for Appendix P. In addition, add the acronym and abbreviation list to the table of contents.

VOLUME XXVII

Replace covers of the draft report with the provided covers for the draft final report.

VOLUME XXVIII

Add new volume.



NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.2.4 AND 4.2.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.2–7
Schematic Cross Section Showing Migration of Main Contaminants at IR–01/21 Parcel E Remedial Investigation

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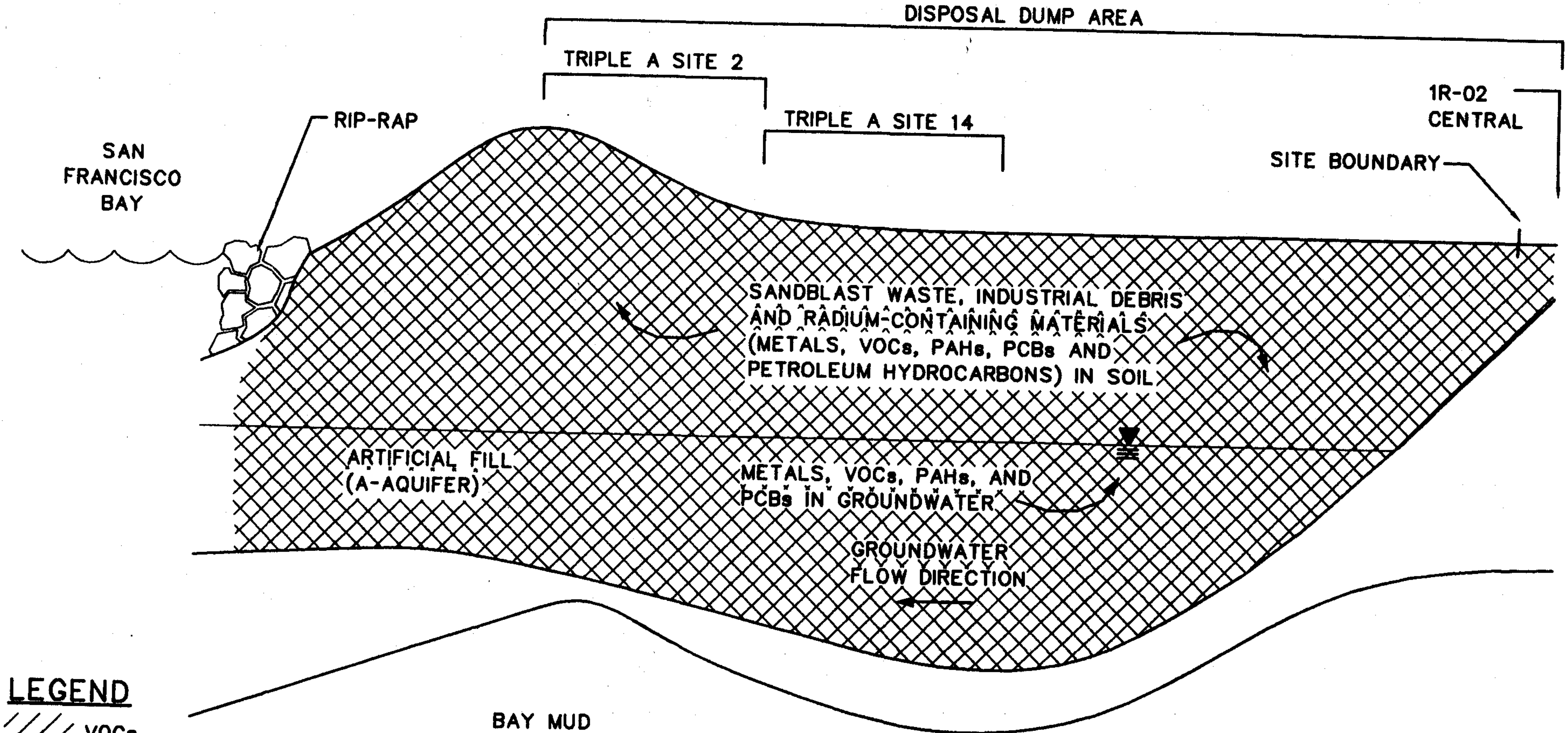

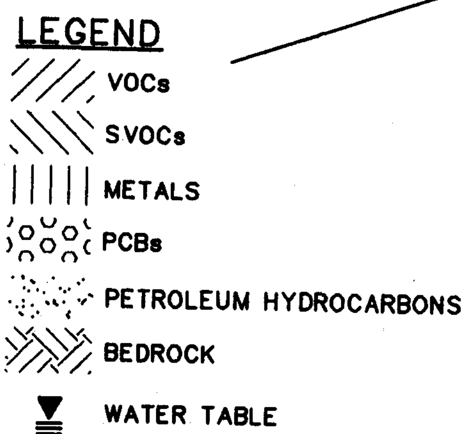

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.3.4 AND 4.3.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.3-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-02 Northwest Parcel E Remedial Investigation

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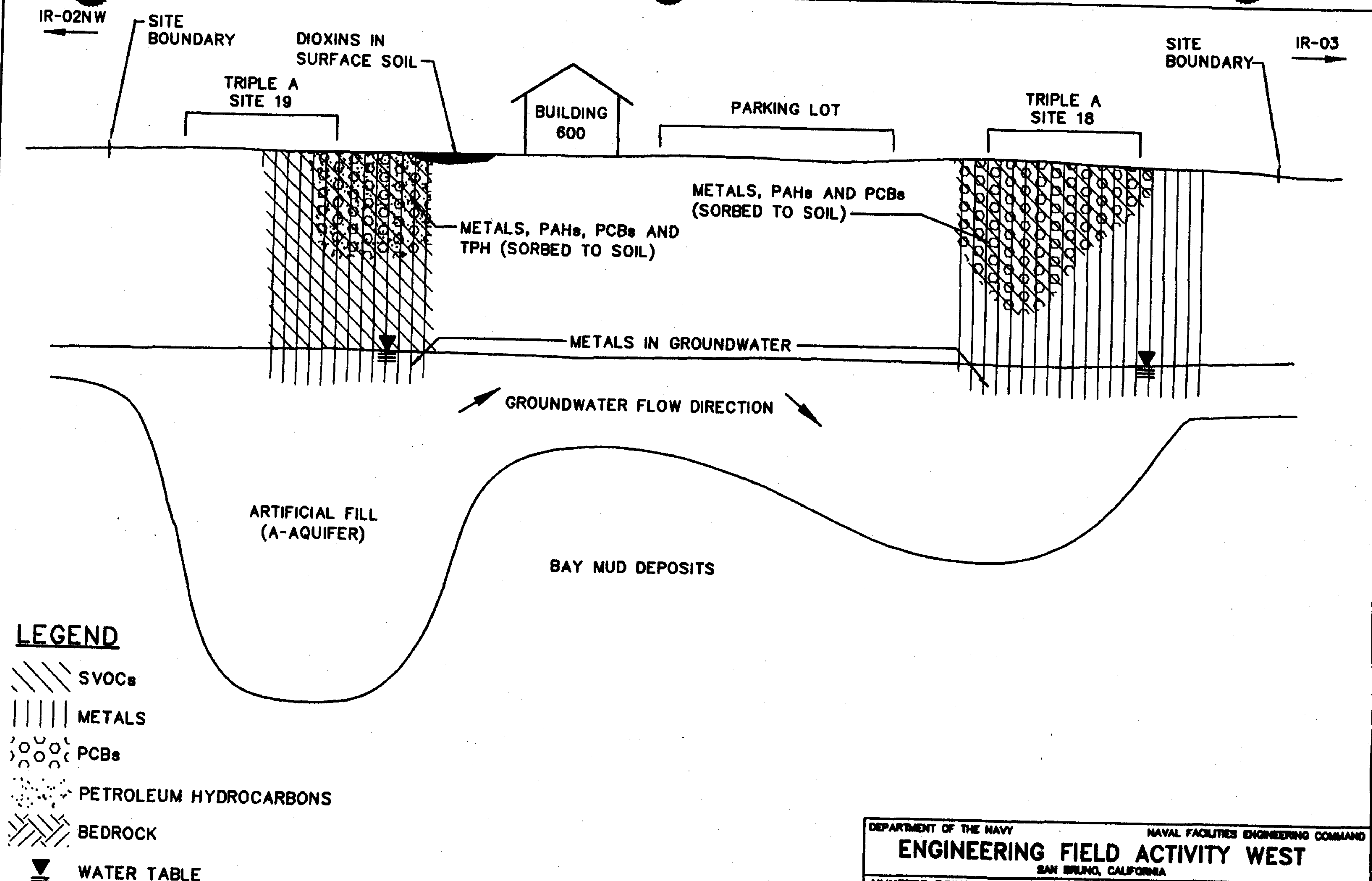

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.4.4 AND 4.4.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.4-6
Schematic Cross Section Showing Migration of Main Contaminants at IR-02 Central Parcel E Remedial Investigation

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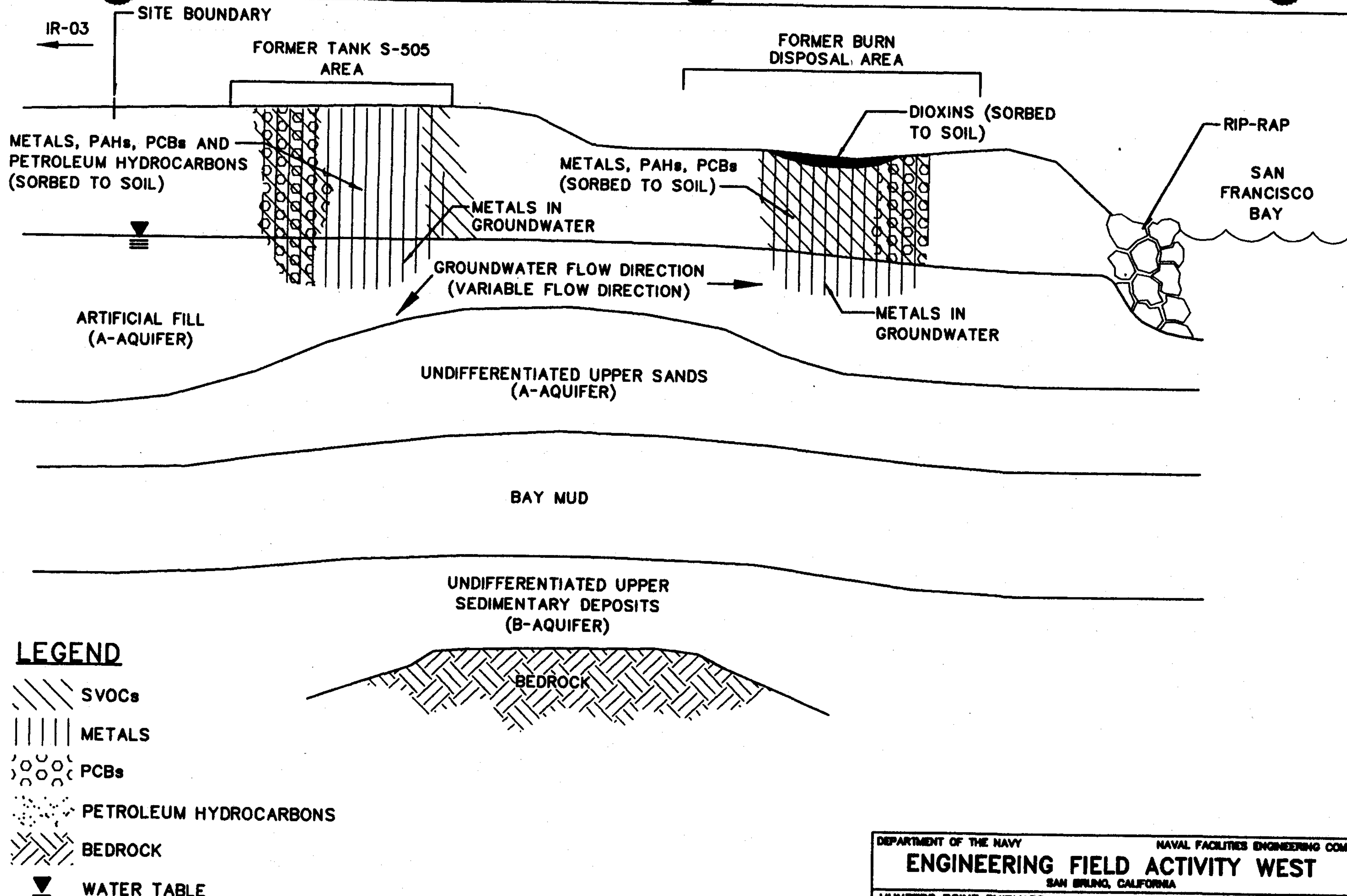

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.5.4 AND 4.5.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.5-6

Schematic Cross Section Showing Migration of Main Contaminants at IR-02 Southeast Parcel E Remedial Investigation

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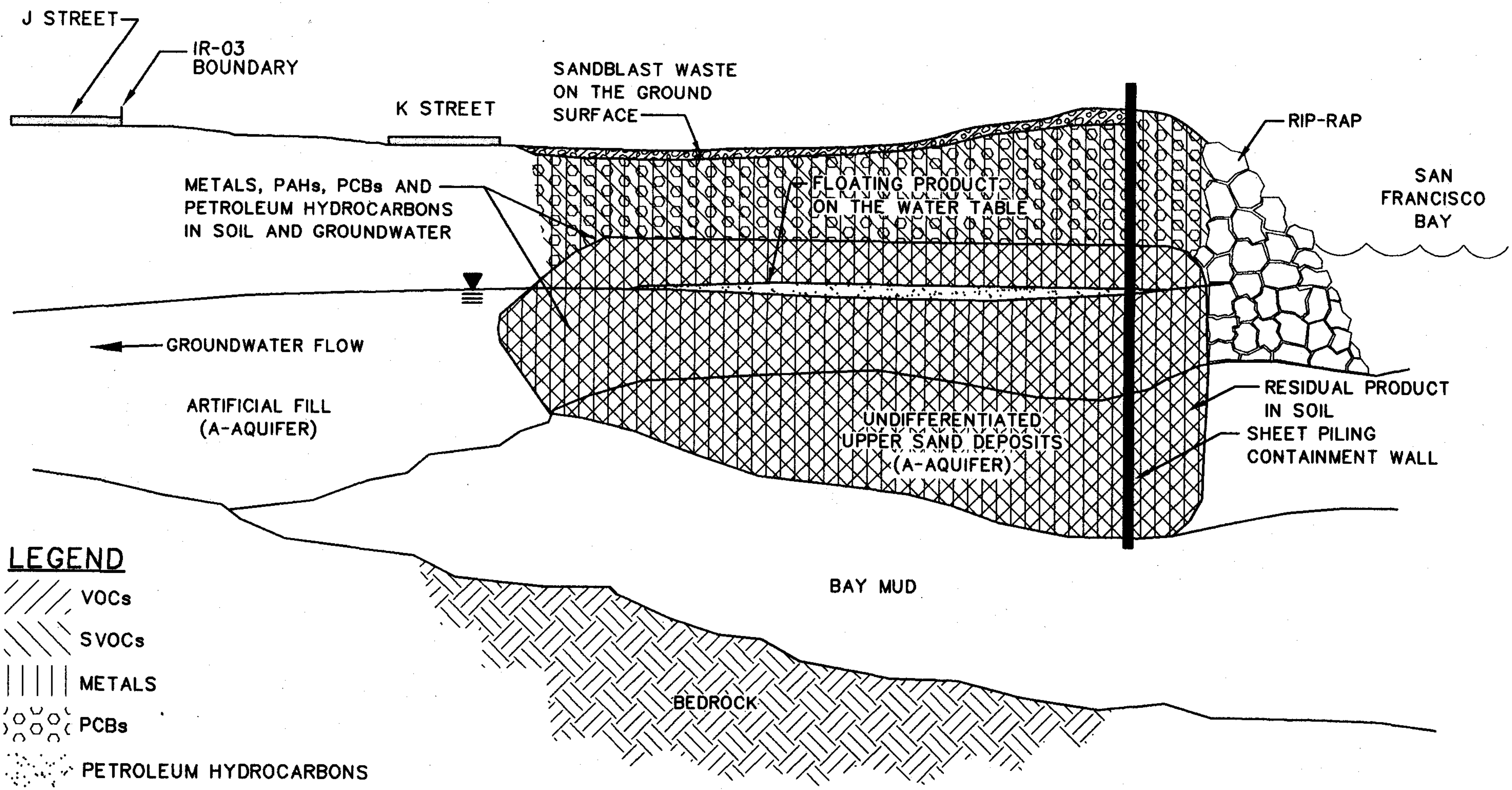

LEGEND

- VOCs
- SVOCs
- METALS
- PCBs
- PETROLEUM HYDROCARBONS
- BEDROCK
- SANDBLAST WASTE
- WATER TABLE

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.6.4 AND 4.6.5.

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA
HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Figure 4.6-6
Schematic Cross Section Showing Migration of Main Contaminants at IR-03 Parcel E Remedial Investigation

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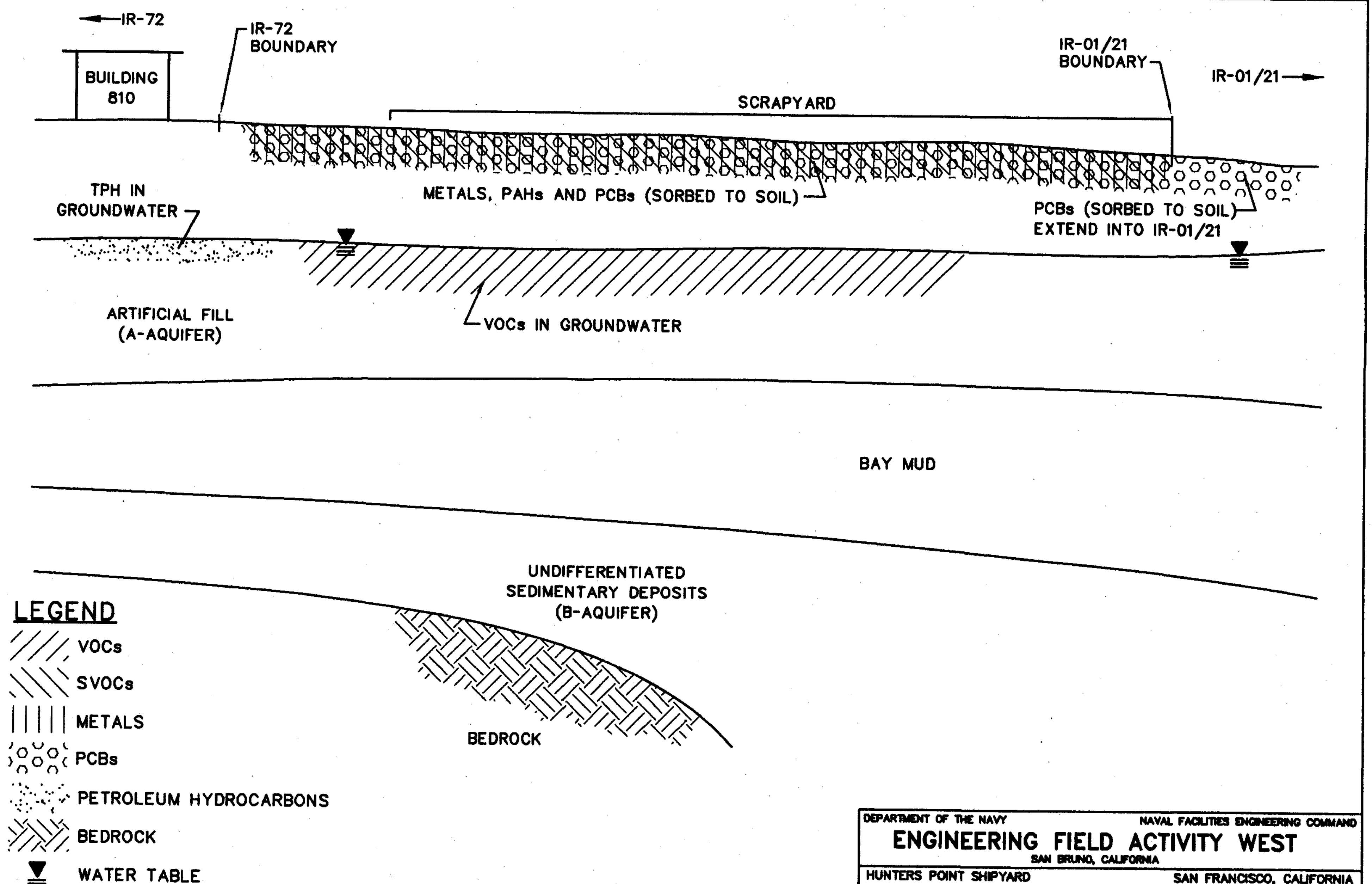

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.7.4 AND 4.7.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.7-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-04
Parcel E Remedial Investigation

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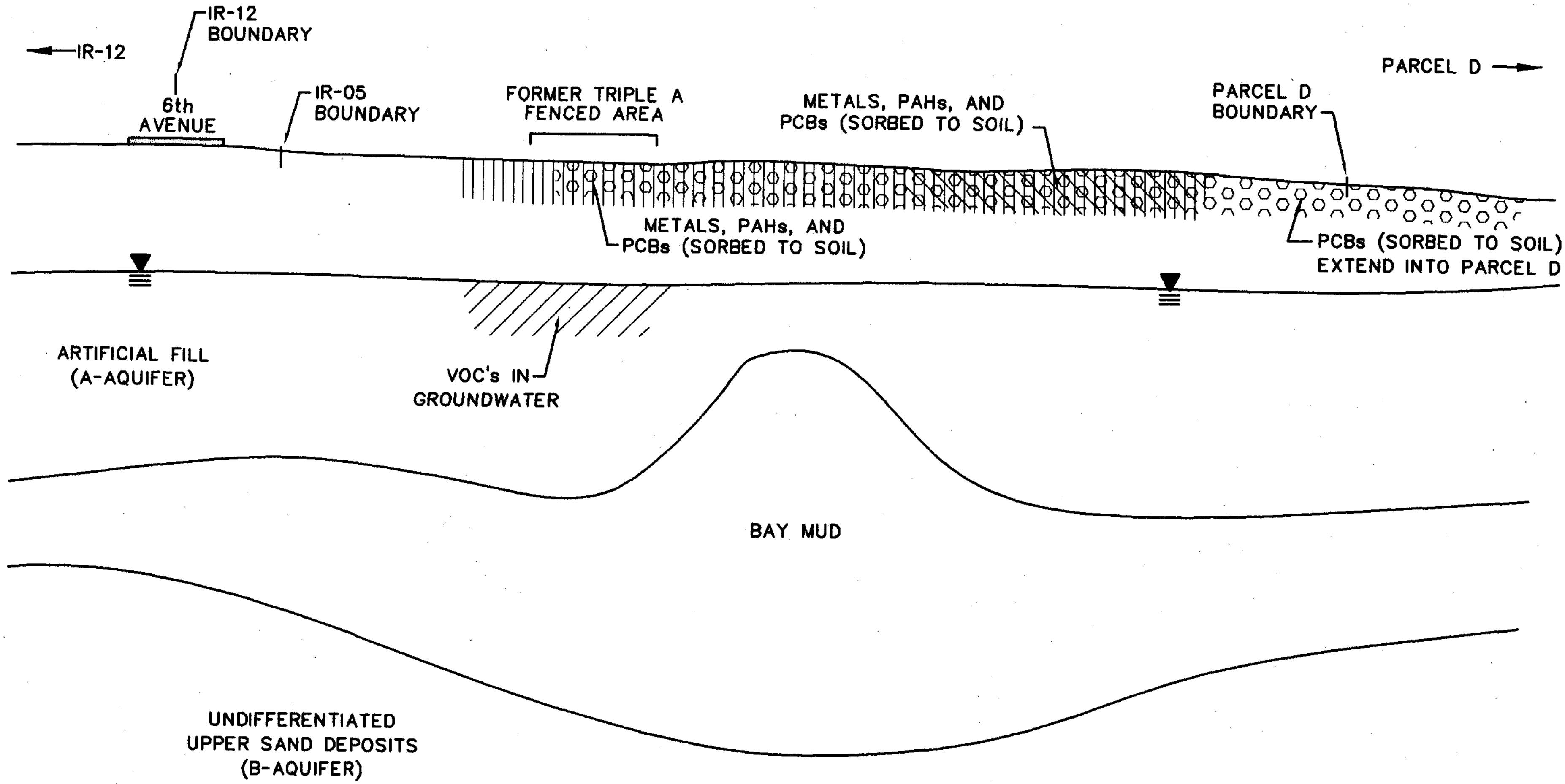

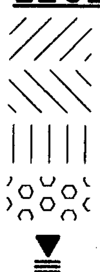

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.8.4 AND 4.8.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.8-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-05
Parcel E Remedial Investigation

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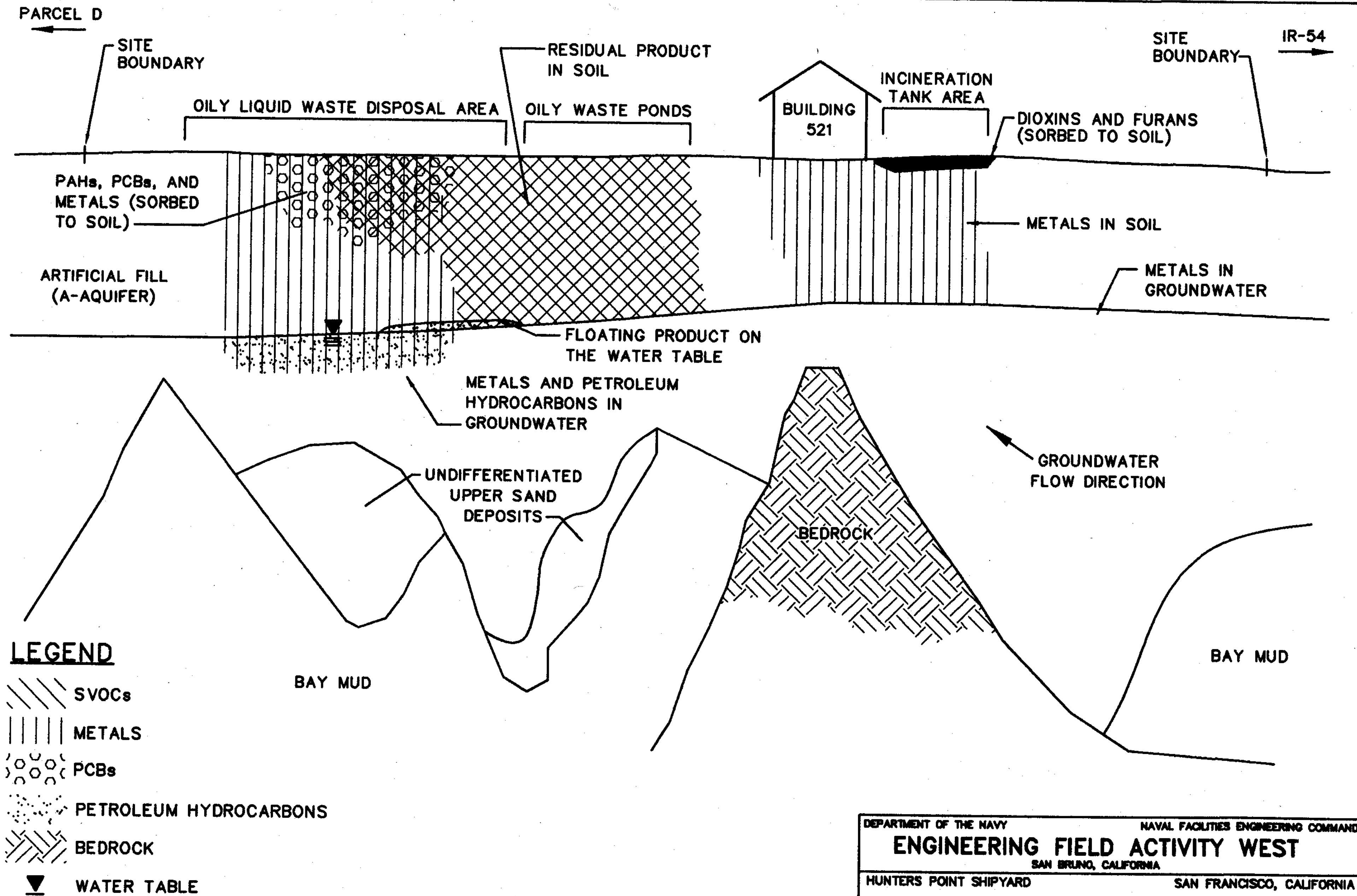

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.9.4 AND 4.9.5.

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Figure 4.9-6

Schematic Cross Section Showing Migration of Main Contaminants at IR-11/14/15 Parcel E Remedial Investigation

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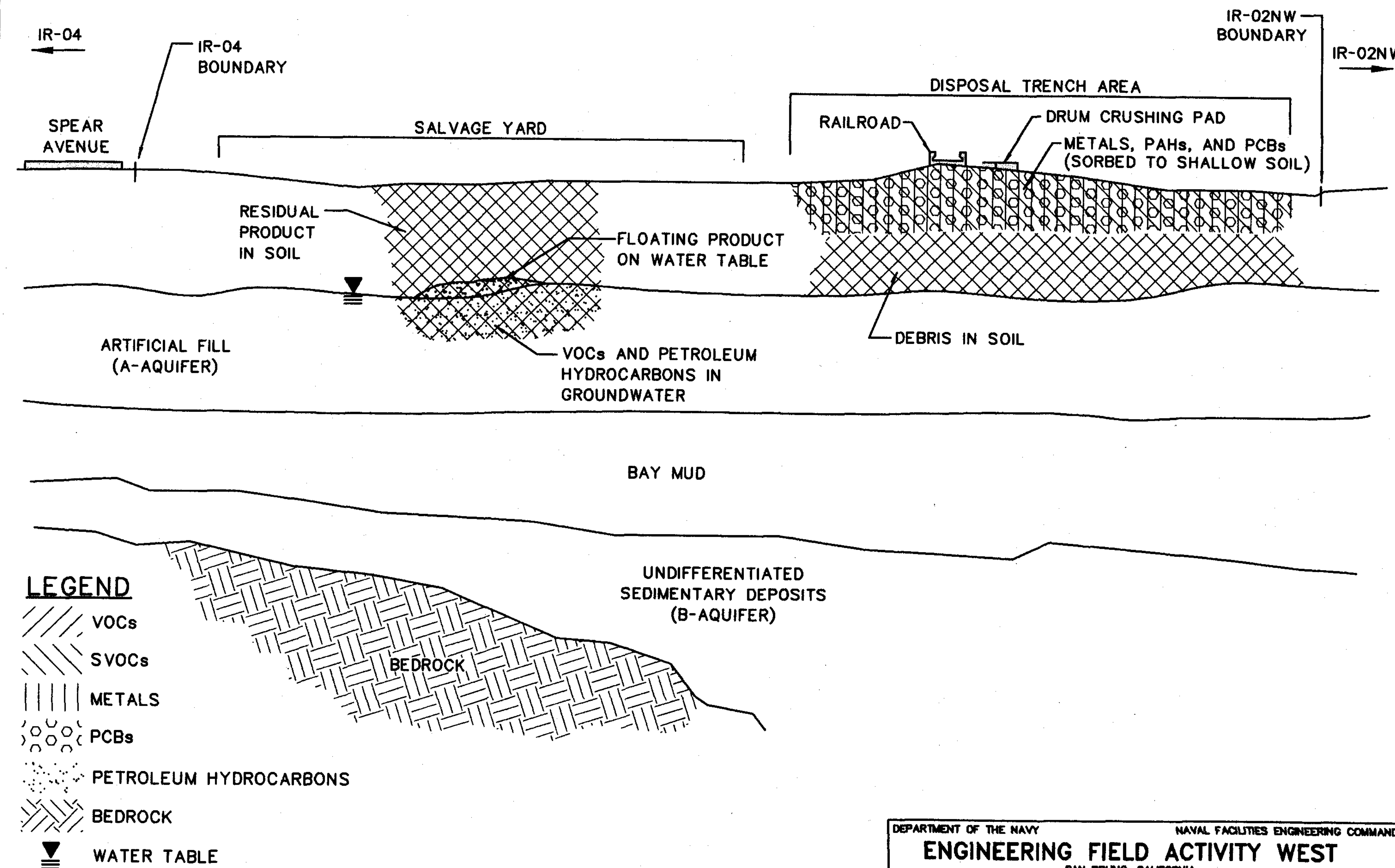


NOTES

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.10.4 AND 4.10.5.

GROUNDWATER FLOW IS INTO THE PAGE.

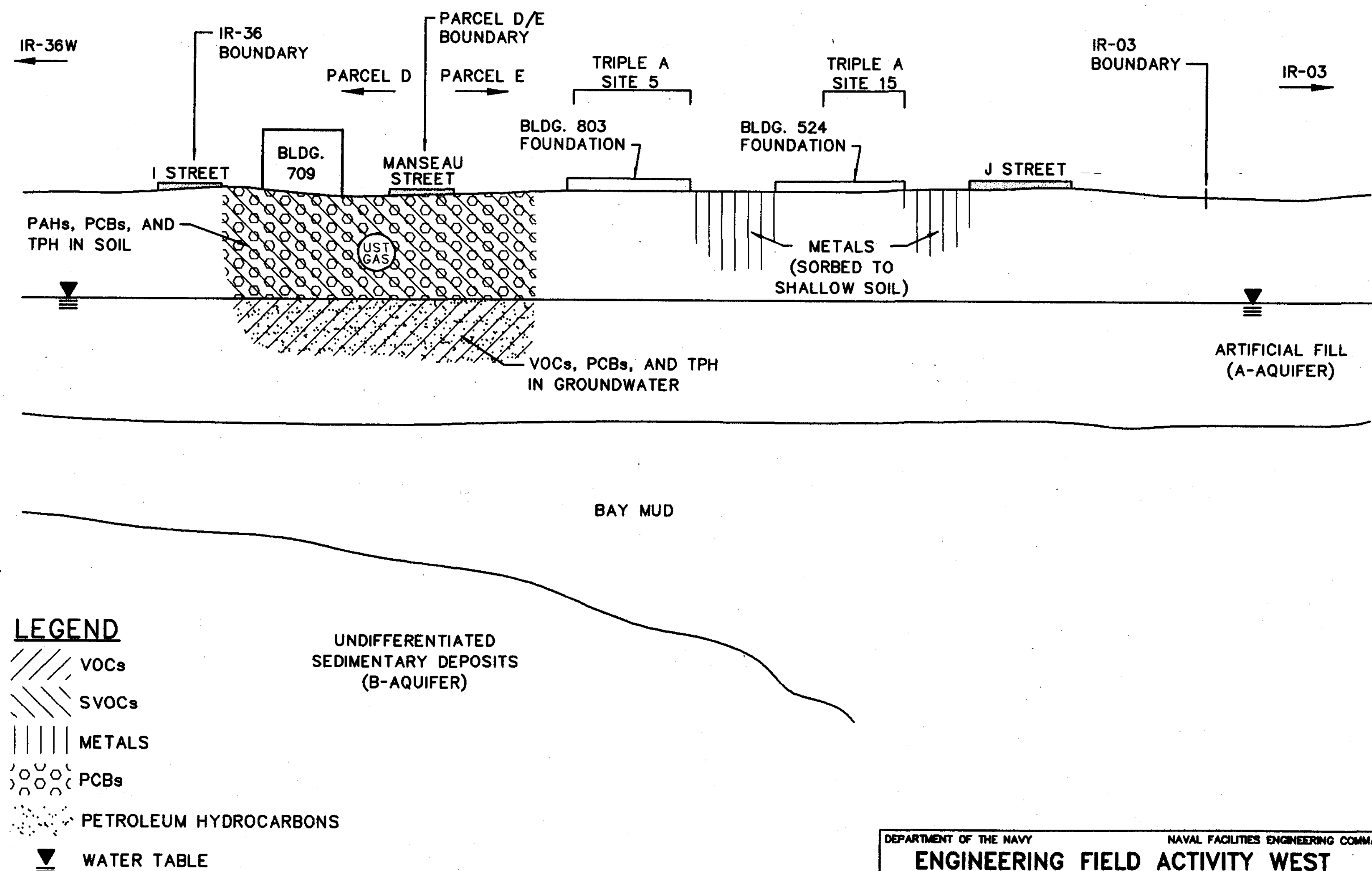
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.10-6
Schematic Cross Section Showing Migration of Main Contaminants at IR-12
Parcel E Remedial Investigation



NOTES

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.11.4 AND 4.11.5.

GROUNDWATER FLOW IS INTO THE PAGE.

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Figure 4.11-4

Schematic Cross Section Showing Migration of Main Contaminants at IR-13 Parcel E Remedial Investigation

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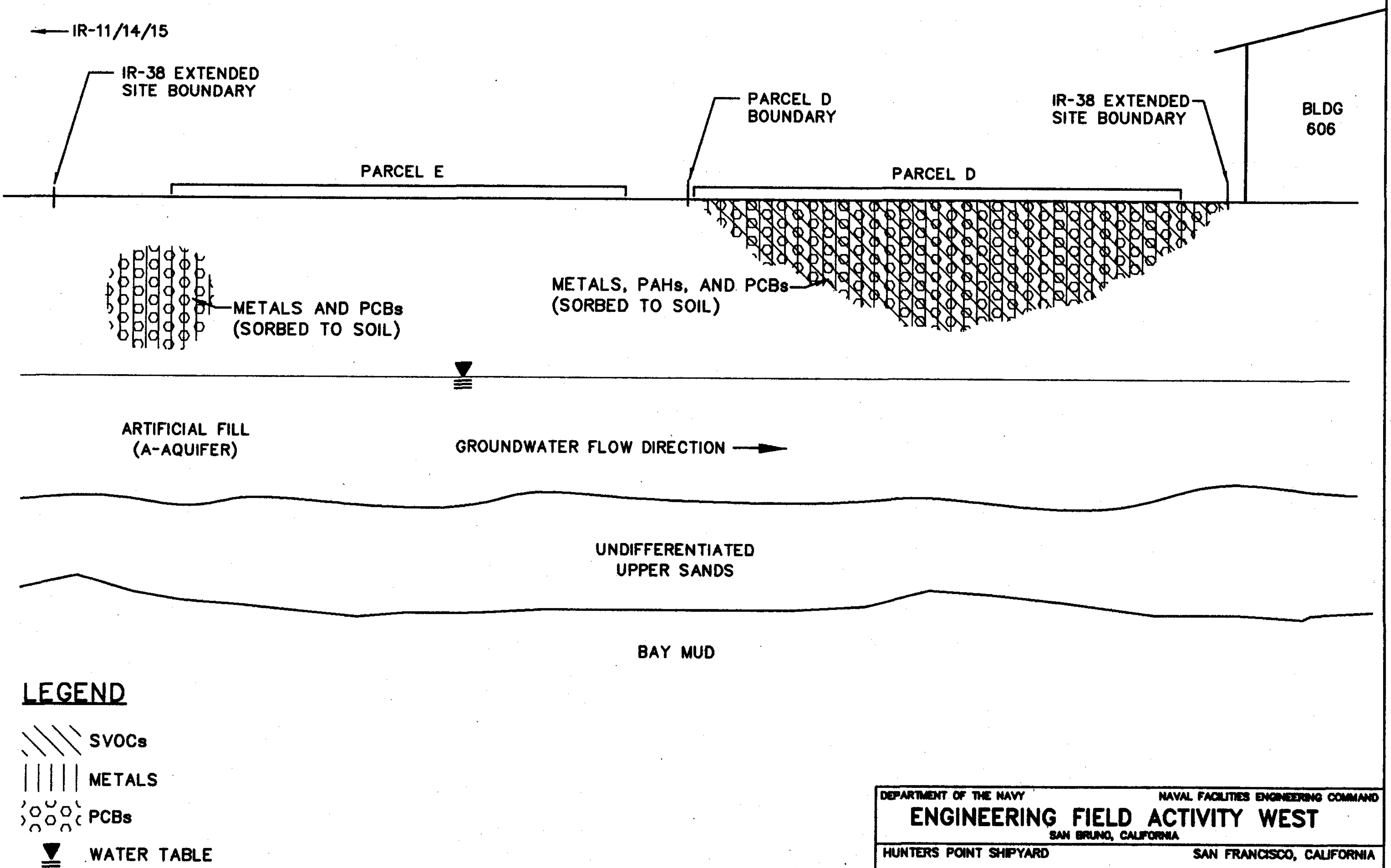

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.12.4 AND 4.12.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.12-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-38
Parcel E Remedial Investigation

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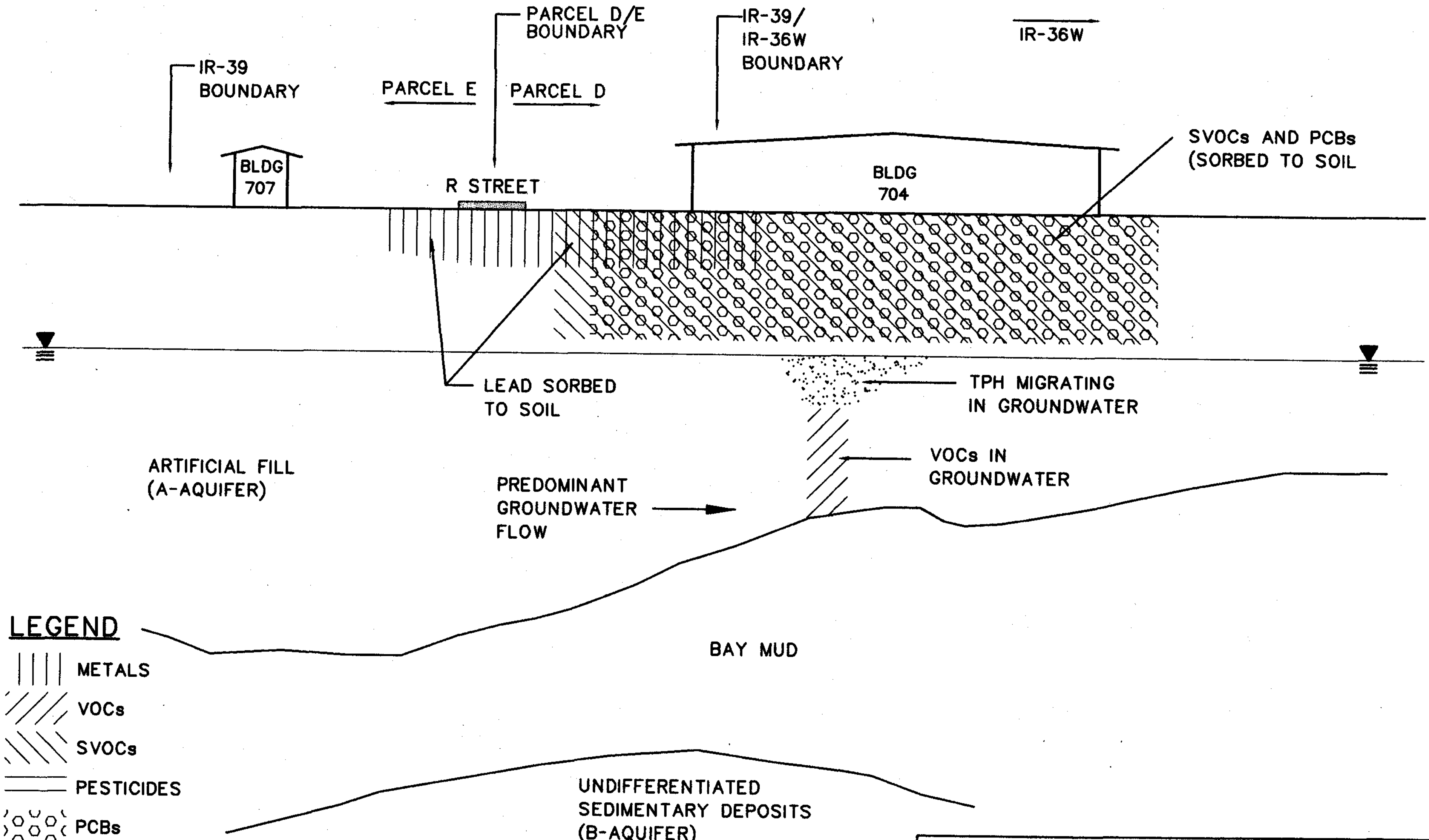

LEGEND

- METALS
- VOCs
- SVOCs
- PESTICIDES
- PCBs
- PETROLEUM HYDROCARBONS
- WATER TABLE

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.13.4 AND 4.13.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.13–4
Schematic Cross Section Showing Migration of Main Contaminants at IR–39 Parcel E Remedial Investigation

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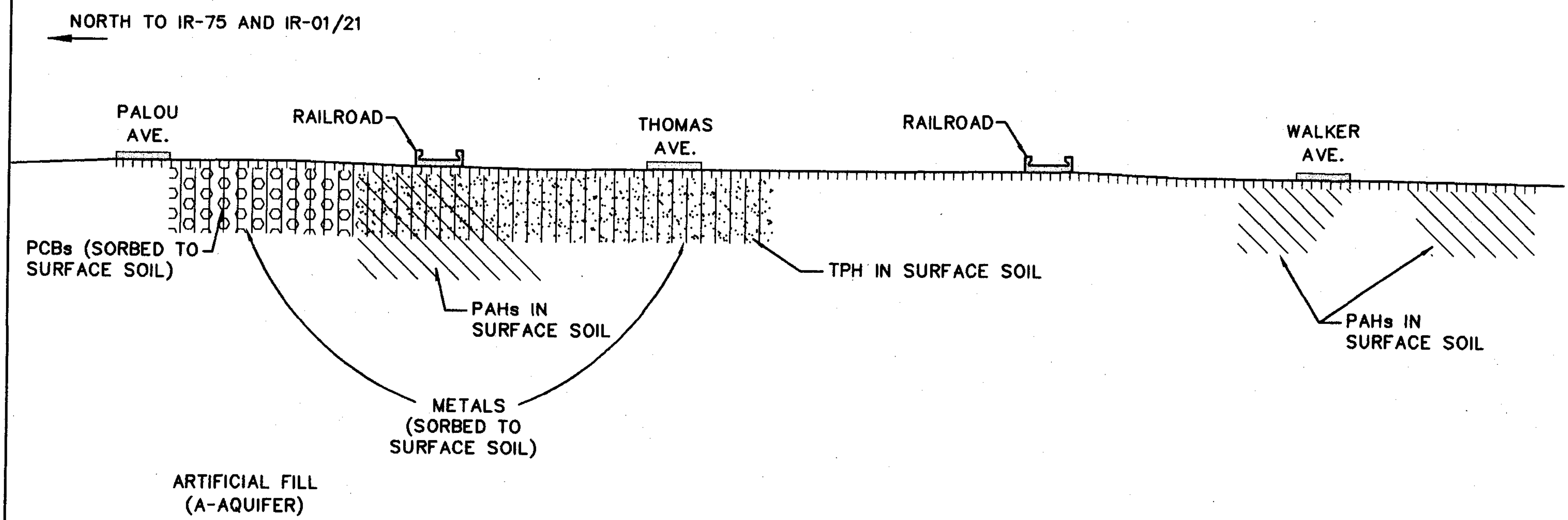


LEGEND

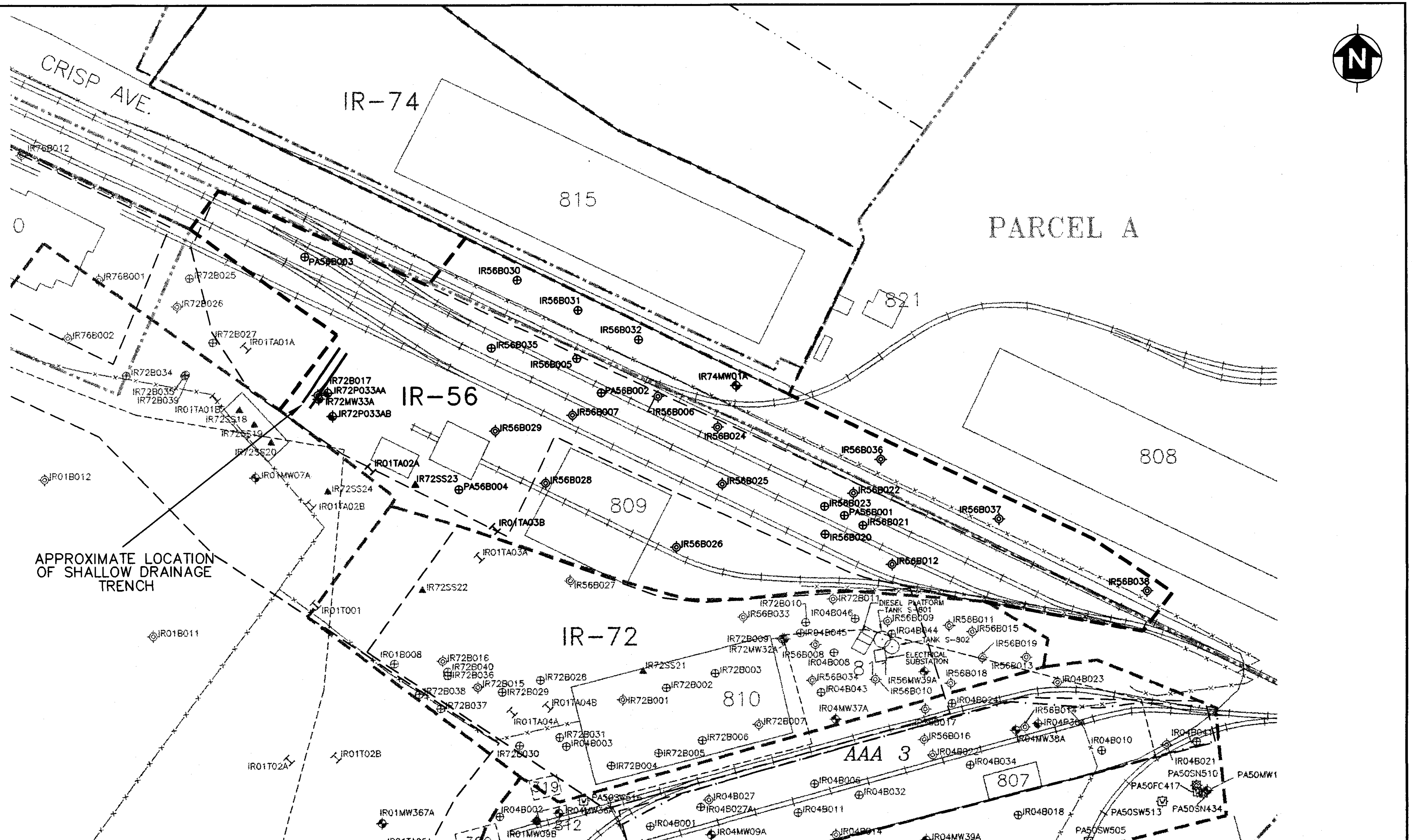
- SVOCs
- METALS
- PCBs
- PETROLEUM HYDROCARBONS

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.20.4 AND 4.20.5.

DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST SAN BRUNO, CALIFORNIA	
HUNTERS POINT SHIPYARD	SAN FRANCISCO, CALIFORNIA

Figure 4.20-3
Schematic Cross Section Showing Migration of Main Contaminants at IR-52
Parcel E Remedial Investigation



EXPLANATION:

▲	SURFACE OR NEAR SURFACE SOIL SAMPLE
⊕	SOIL BORING
	SOIL BORING/HYDROPUNCH
	A-AQUIFER MONITORING WELL
	B-AQUIFER MONITORING WELL
	BEDROCK WATER BEARING ZONE MONITORING WELL
H	TEST PIT
	PIEZOMETER
	SANITARY SEWER SAMPLE
	STORM DRAIN SAMPLE
	STEAM LINE SAMPLE
	CONCRETE SAMPLE
	AAA SITE BOUNDARY
	IR SITE BOUNDARY
	PARCEL BOUNDARY
	FENCE
	RAILROAD TRACKS
	DATA SET BOUNDARY (EXTENDED SITE BOUNDARY)
●	SOIL-GAS SAMPLE

50 0 50 100
SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.22-1
IR-56 SITE BOUNDARY AND SAMPLE LOCATIONS
PARCEL E REMEDIAL INVESTIGATION

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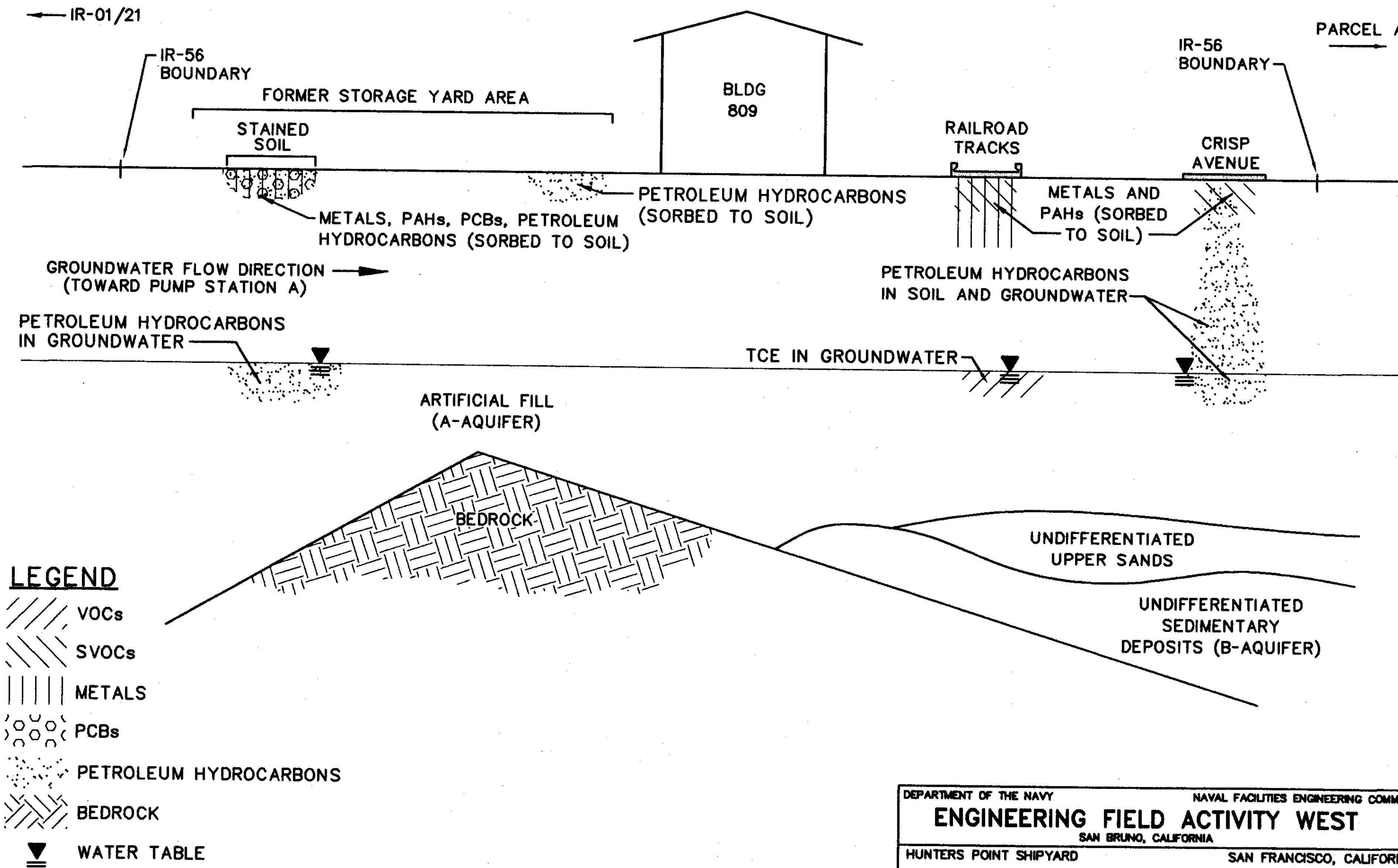

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.22.4 AND 4.22.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.22-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-56
Parcel E Remedial Investigation

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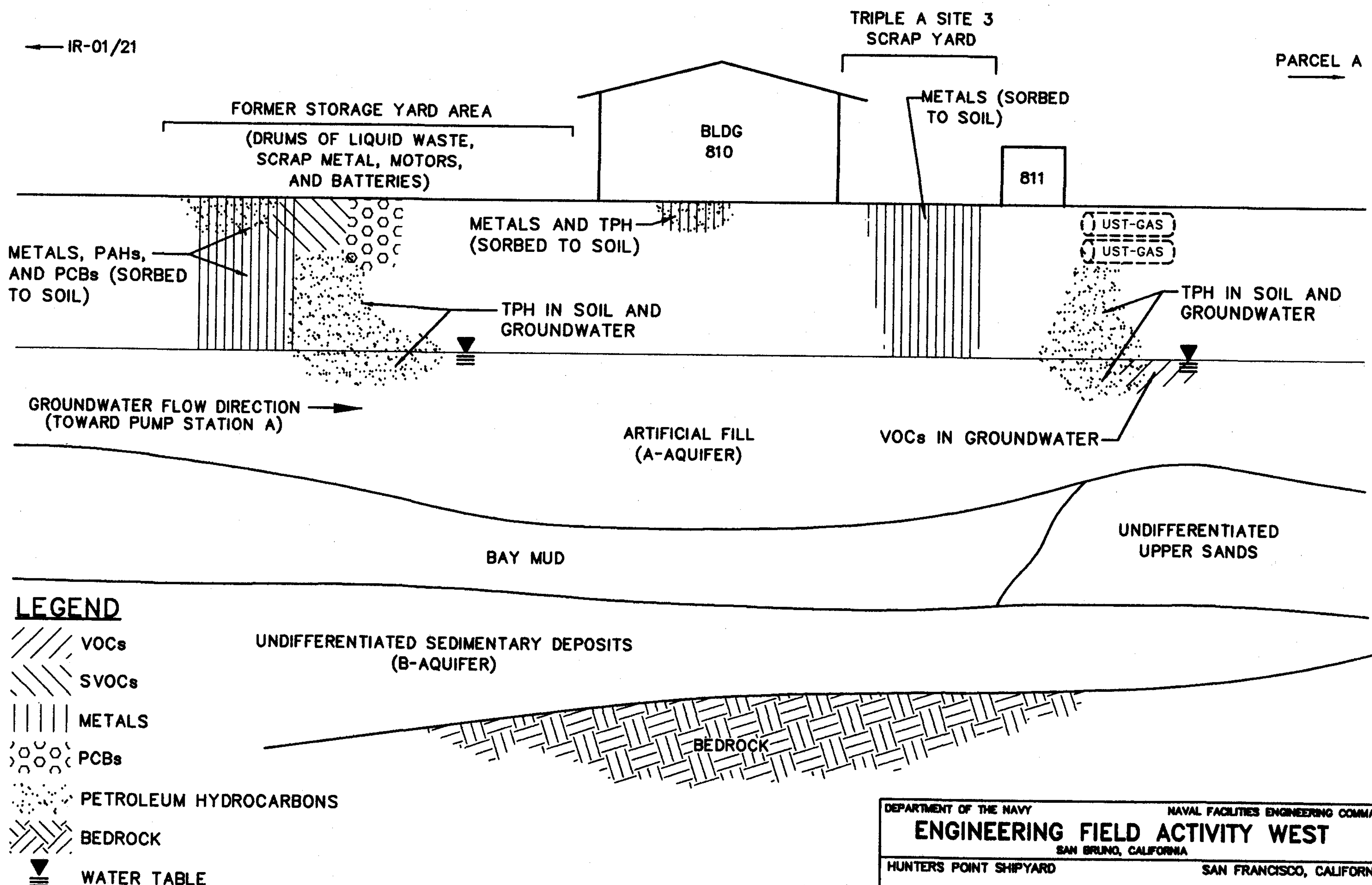


NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.23.4 AND 4.23.5.

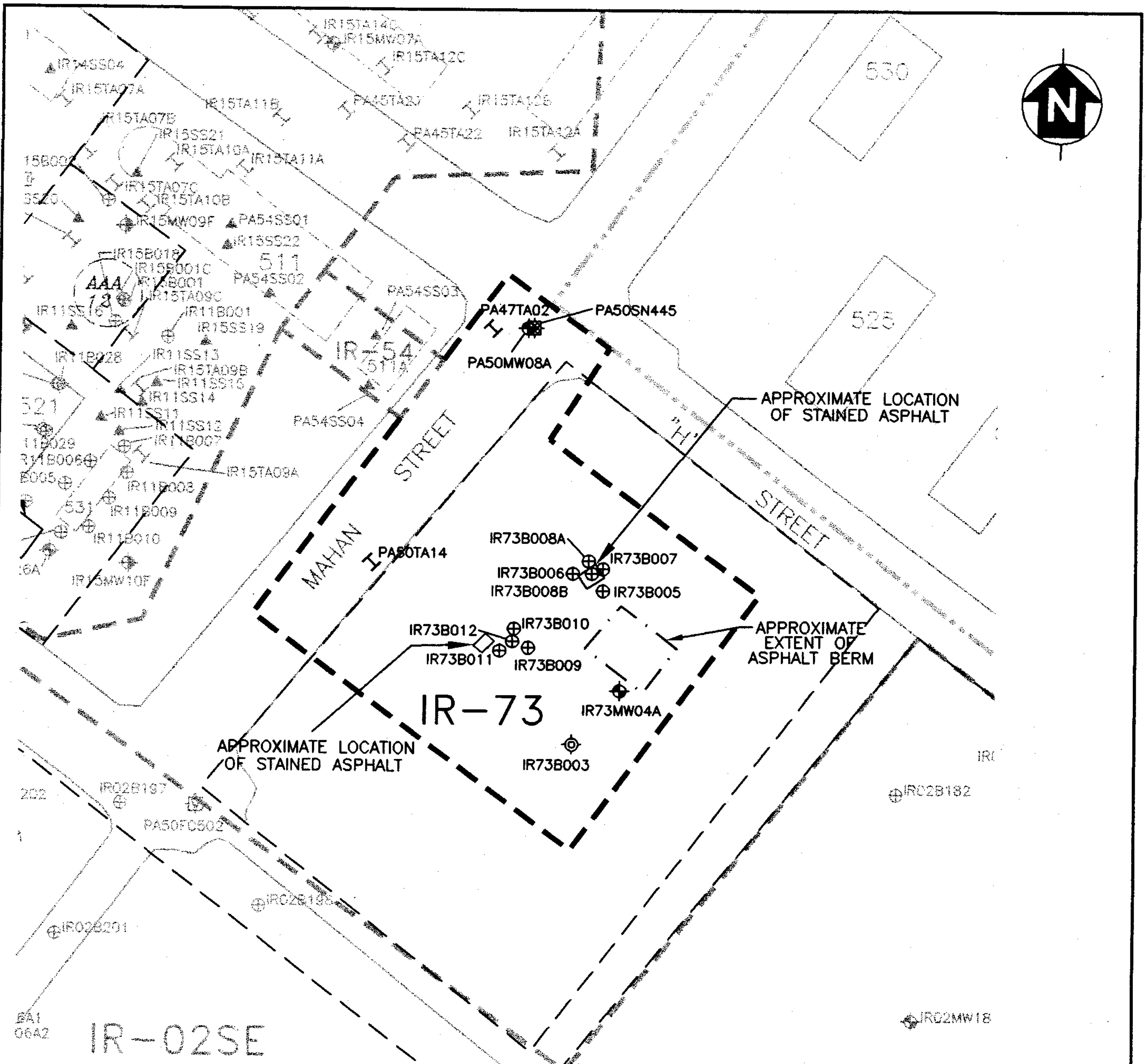
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Figure 4.23-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-72
Parcel E Remedial Investigation



EXPLANATION:

▲	SURFACE OR NEAR SURFACE SOIL SAMPLE
⊕	SOIL BORING
	SOIL BORING/HYDROPUNCH
	A-AQUIFER MONITORING WELL
	B-AQUIFER MONITORING WELL
	BEDROCK WATER BEARING ZONE MONITORING WELL
H	TEST PIT
	PIEZOMETER
	SANITARY SEWER SAMPLE
	STORM DRAIN SAMPLE
ST	STEAM LINE SAMPLE
©	CONCRETE SAMPLE
	AAA SITE BOUNDARY
	IR SITE BOUNDARY
	PARCEL BOUNDARY
	FENCE
	RAILROAD TRACKS
	DATA SET BOUNDARY (EXTENDED SITE BOUNDARY)

50 0 50 100
SCALE IN FEET

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

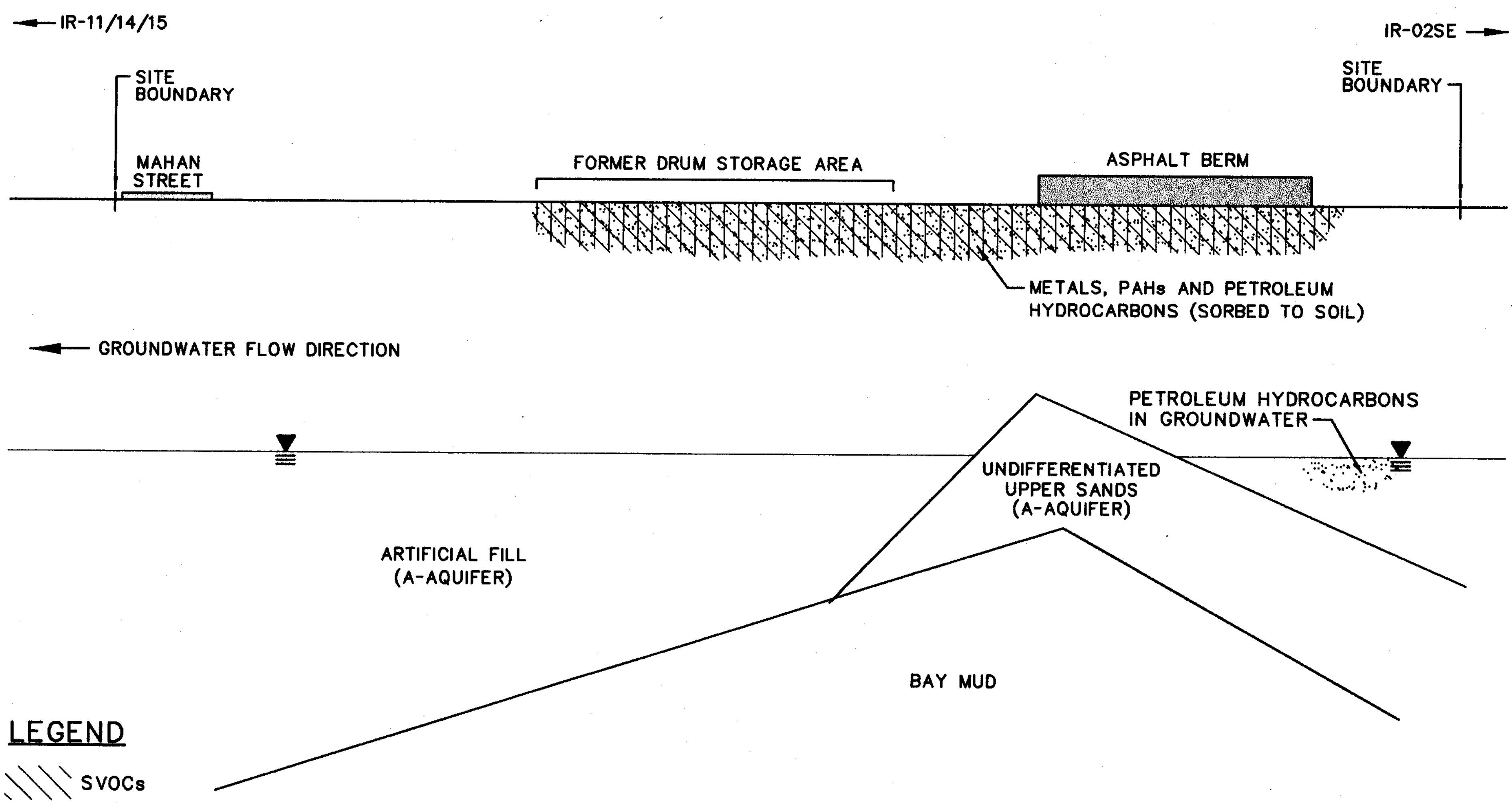
SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

FIGURE 4.24-1
IR-73 SITE BOUNDARY AND SAMPLE LOCATIONS
PARCEL E REMEDIAL INVESTIGATION

DATE: 04/24/97 - 069-0058050201 FILE NAME: HPE-RI.DWG RVR REV 10/09/97 FILE NAME: O:\HUNTER\PARCELE\SITEMAPS\HPE-RI.DWG BEB

R:\069\005B\ 201\EPARCEL\IR-73.DWG JAY DN 10/23/97



LEGEND

- SVOCs
- METALS
- PCBs
- PETROLEUM HYDROCARBONS
- WATER TABLE

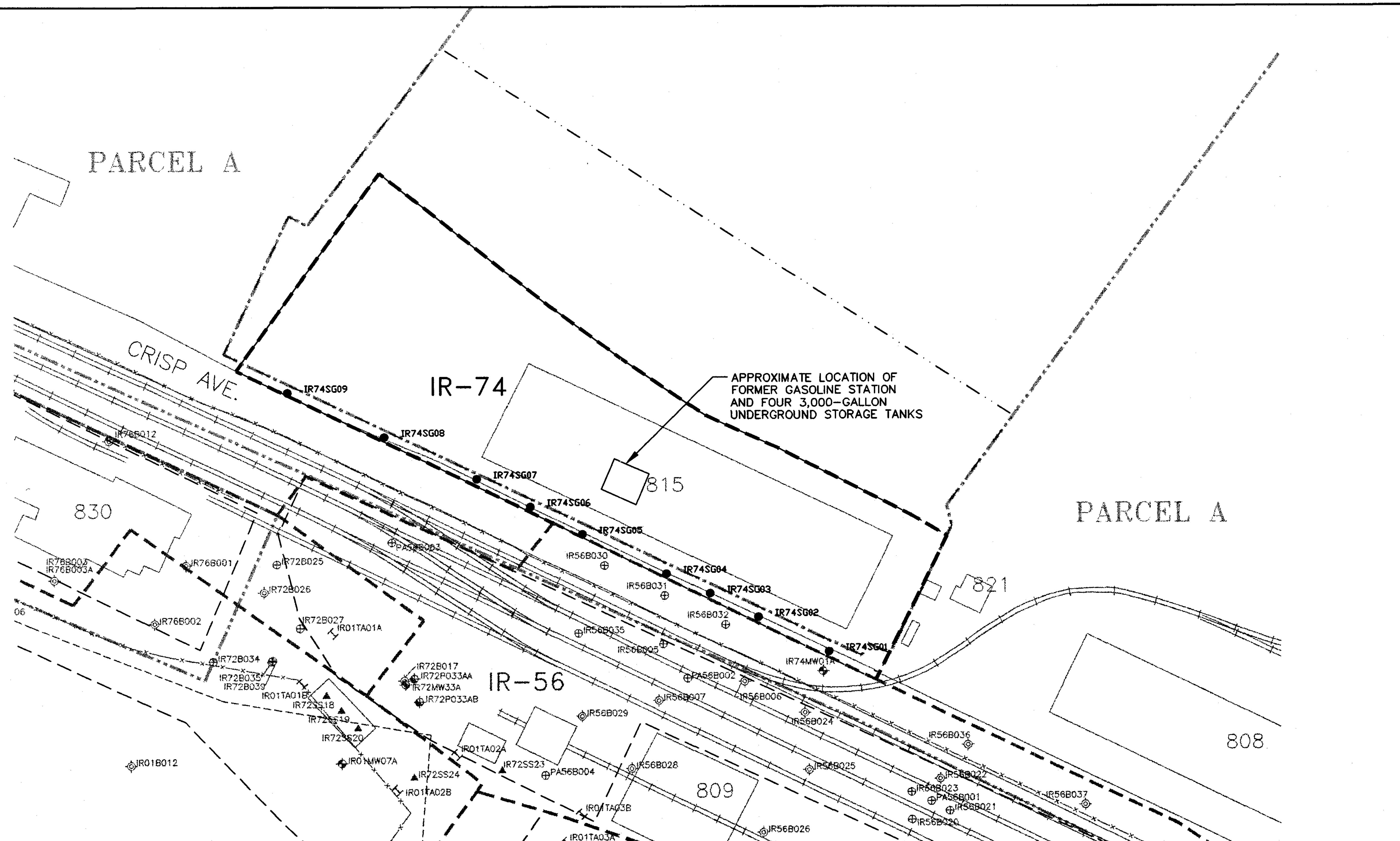
NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.24.4 AND 4.24.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.24-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-73
Parcel E Remedial Investigation



EXPLANATION:

- ▲ SURFACE OR NEAR SURFACE SOIL SAMPLE
- ⊕ SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK WATER BEARING ZONE MONITORING WELL
- H TEST PIT
- PIEZOMETER
- SANITARY SEWER SAMPLE
- STORM DRAIN SAMPLE
- STEAM LINE SAMPLE
- CONCRETE SAMPLE
- AAA SITE BOUNDARY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- FENCE
- RAILROAD TRACKS
- DATA SET BOUNDARY (EXTENDED SITE BOUNDARY)
- ● SOIL-GAS SAMPLE
- PRIVATE PROPERTY LINE FOR F.U.D.S. (FORMERLY USED DEFENSE SITE)

50 0 50 100

SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

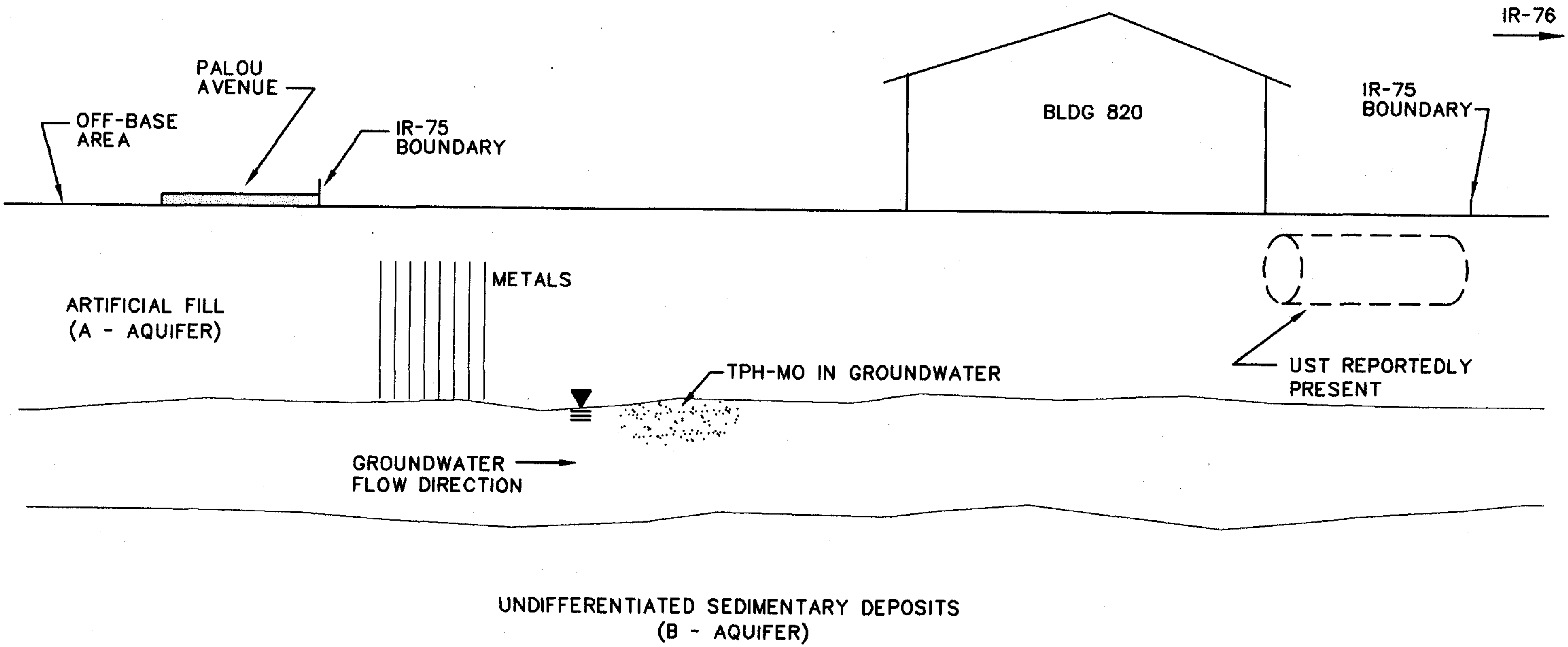
FIGURE 4.25-1

IR-74 SITE BOUNDARY AND SAMPLE LOCATIONS

PARCEL E REMEDIAL INVESTIGATION

DATE: 04/25/97 - 069-0059050201 FILE NAME: HPE-RI.DWG RVR REV 10/09/97 FILE NAME: O:\HUNTER\PARCELE\SITEMAPS\HPE-RI.DWG BEB

R:\069\005B\[illegible]01\EPARCEL\IR-75.DWG JAY DN 10/23/97



LEGEND

||||| METALS

PETROLEUM HYDROCARBONS

WATER TABLE

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.26.4 AND 4.26.5.

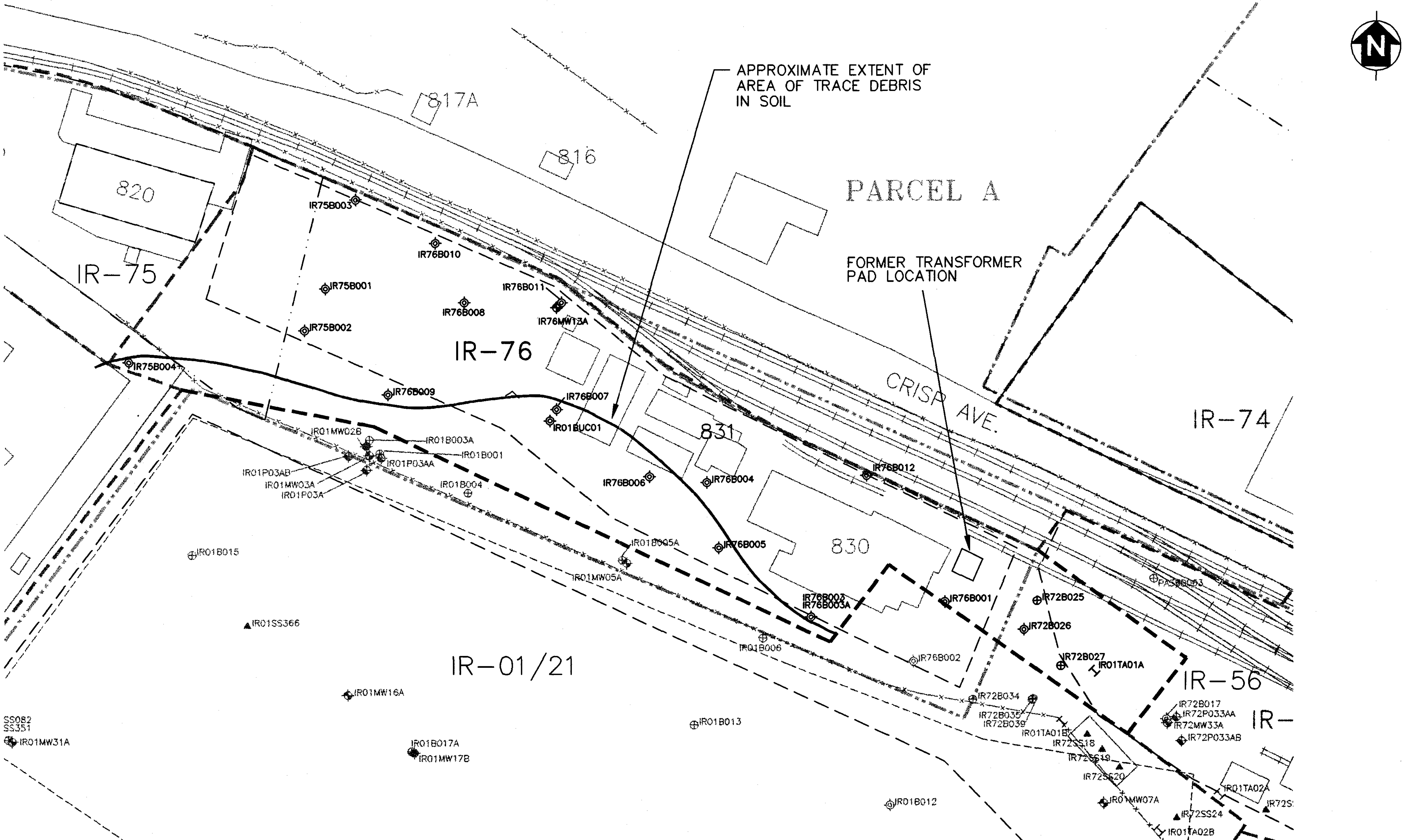
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.26-4
Schematic Cross Section Showing Migration of Main Contaminants at IR-75
Parcel E Remedial Investigation



EXPLANATION:

- ▲ SURFACE OR NEAR SURFACE SOIL SAMPLE
- ⊕ SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK WATER BEARING ZONE MONITORING WELL
- H TEST PIT
- PIEZOMETER
- SANITARY SEWER SAMPLE
- STORM DRAIN SAMPLE
- STEAM LINE SAMPLE
- CONCRETE SAMPLE
- AAA SITE BOUNDARY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- FENCE
- RAILROAD TRACKS
- DATA SET BOUNDARY (EXTENDED SITE BOUNDARY)
- ● SOIL-GAS SAMPLE
- PRIVATE PROPERTY LINE FOR F.U.D.S. (FORMERLY USED DEFENSE SITE)

50 0 50 100

SCALE IN FEET

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

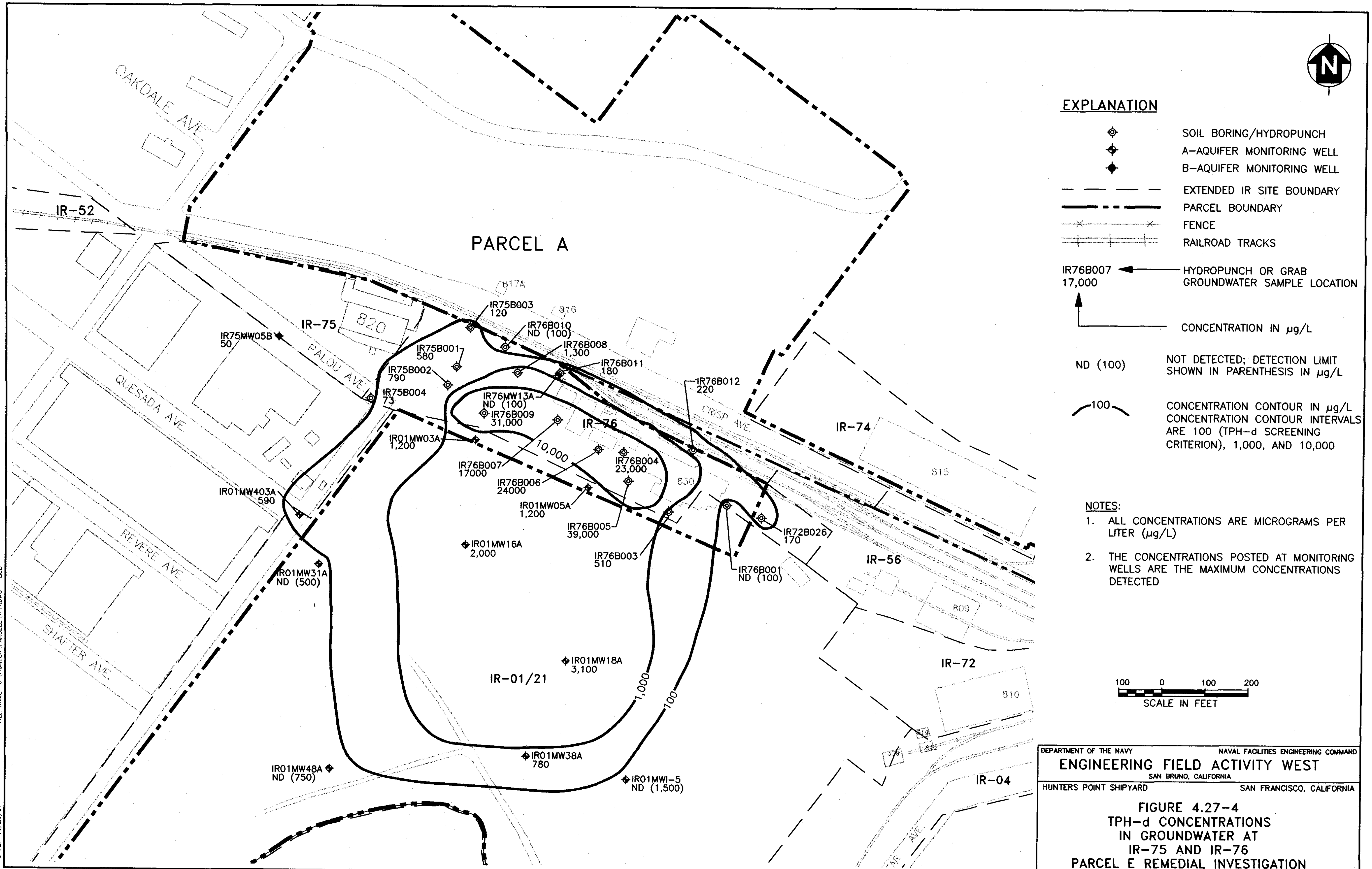
HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

FIGURE 4.27-1

IR-76 SITE BOUNDARY AND SAMPLE LOCATIONS

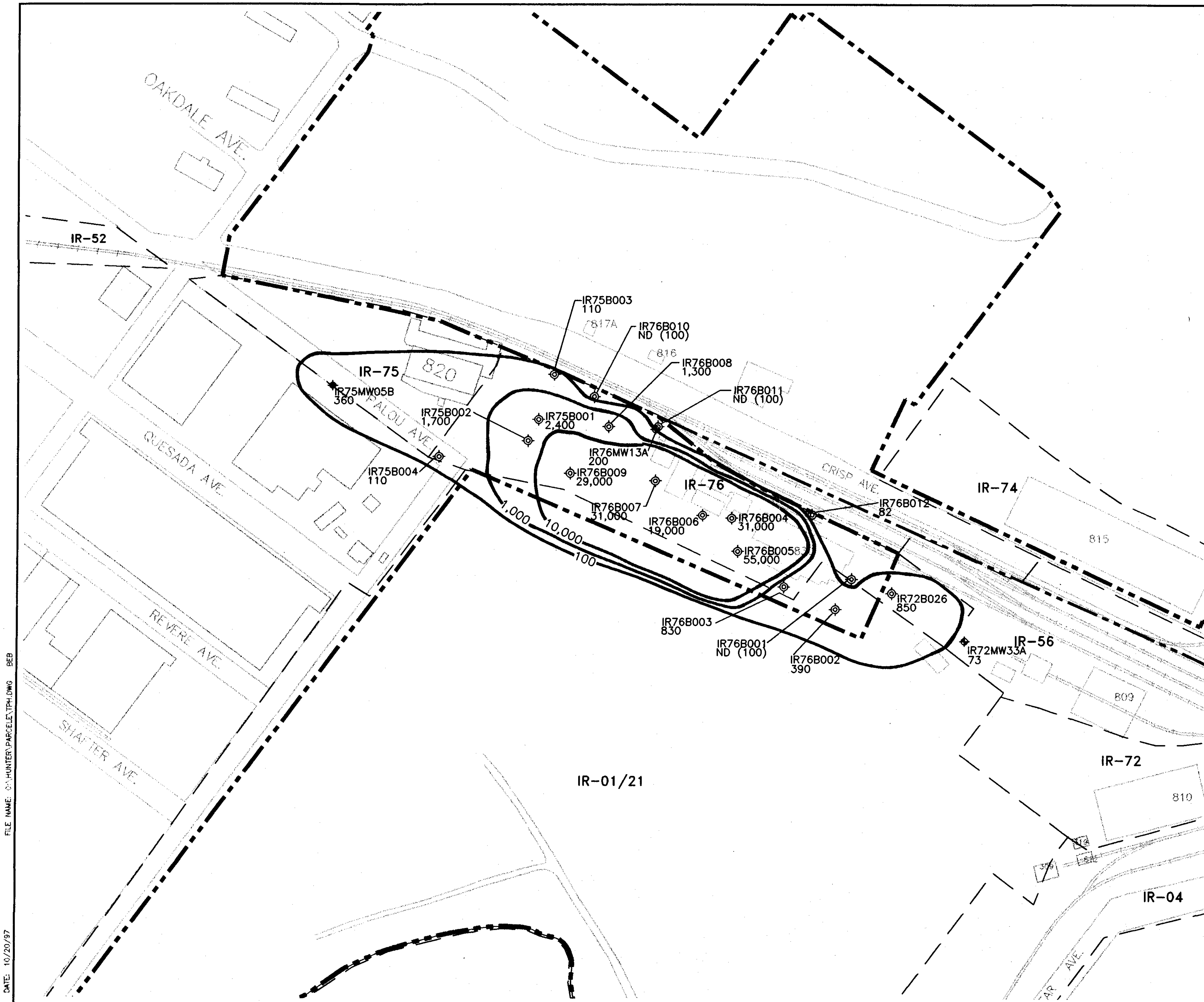
PARCEL E REMEDIAL INVESTIGATION

DATE: 04/25/97 - 089-0058050201 FILE NAME:HPE-RI.DWG RVR REV 10/10/97 FILE NAME: O:\HUNTER\PARCELE\SITEMAPS\HPE-RI.DWG BEB



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.27-4
TPH-d CONCENTRATIONS
IN GROUNDWATER AT
IR-75 AND IR-76
PARCEL E REMEDIAL INVESTIGATION



EXPLANATION

SOIL BORING/HYDROPUNCH

A–AQUIFER MONITORING WELL

B–AQUIFER MONITORING WELL

EXTENDED IR SITE BOUNDARY

PARCEL BOUNDARY

FENCE

RAILROAD TRACKS

IR76B007 ← HYDROPUNCH OR GRAB GROUNDWATER SAMPLE LOCATION
31,000 ← CONCENTRATION IN μg/L

ND (100) NOT DETECTED; DETECTION LIMIT SHOWN IN PARENTHESIS IN μg/L

100 CONCENTRATION CONTOUR IN μg/L CONCENTRATION CONTOUR INTERVALS ARE 100 (TPH–mo SCREENING CRITERION), 1,000, AND 10,000

NOTES:

1. ALL CONCENTRATIONS ARE MICROGRAMS PER LITER (μg/L)
2. THE CONCENTRATIONS POSTED AT MONITORING WELLS IR75MW05B AND IR72MW33A ARE THE MAXIMUM CONCENTRATIONS DETECTED

100 0 100 200
SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

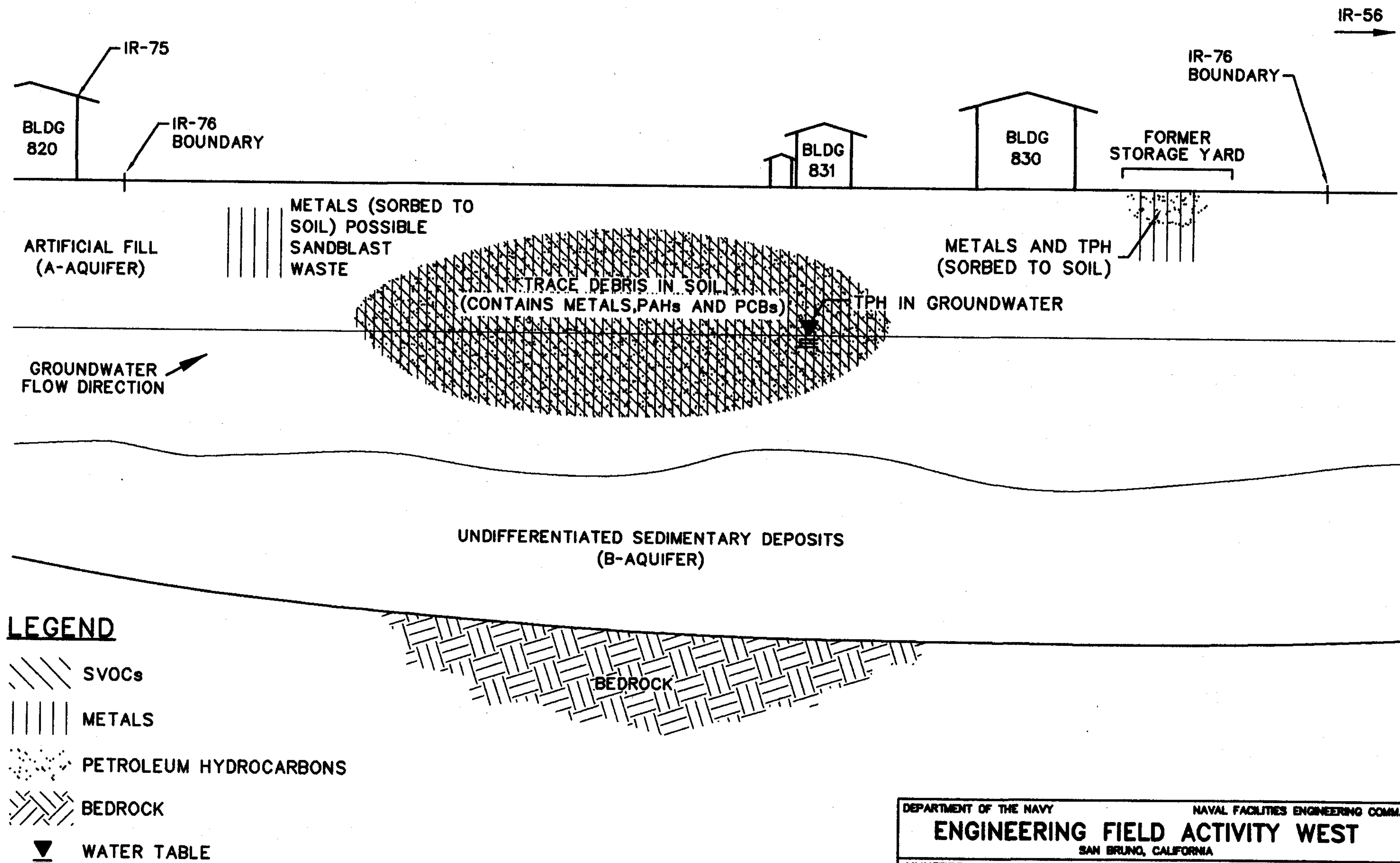
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.27–5
TPH–mo CONCENTRATIONS IN GROUNDWATER AT IR–75 AND IR–76
PARCEL E REMEDIAL INVESTIGATION

FILE NAME: C:\HUNTER\PARCELE\TPH.DWG BEB

DATE: 10/20/97

R:\069\0058 01\EPARCEL\IR-76.DWG JAY DN 10/23/97



NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.27.4 AND 4.27.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.27-6
Schematic Cross Section Showing Migration of Main Contaminants at IR-76 Parcel E Remedial Investigation

APPENDIX C

TIDAL INFLUENCE MONITORING AND AQUIFER TESTING RESULTS

(37 Pages)

CONTENTS

TABLES

Table

1.0 TIDAL INFLUENCE MONITORING

Five rounds of tidal influence monitoring were conducted during the remedial investigation (RI) at Parcel E of Hunters Point Shipyard (HPS):

- First round: October and November 1991
- Second round: February and March 1992
- Third round: February and March 1993
- Fourth round: February and March 1996
- Fifth round: April 1996

Monitoring well selection and field methods, analytical methods, and test results are discussed in the following sections.

1.1 MONITORING WELL SELECTION AND FIELD METHODS

One tidal monitoring station at IR-02 (IR02TS02) was constructed to measure water levels in San Francisco Bay. The monitoring wells selected for tidal influence monitoring at Parcel E are summarized in Table C-1. The following criteria were used to select monitoring wells for the tidal influence monitoring (HLA 1991b):

- Proximity to San Francisco Bay
- Fluctuation in water levels
- Fluctuation in hydraulic gradients
- Minimum of one monitoring well per installation restoration (IR) site
- Two or more monitoring wells per IR site if significant tidal influence was indicated
- Placement of adequate number of monitoring wells for groundwater gradient calculation in critical areas where significant tidal influence was evident

- Available specific conductivity or total dissolved solids (TDS) measurements of groundwater

- Monitoring well location and subsurface lithology

Water levels in the monitoring wells and at the tidal monitoring station, as well as barometric pressure, were measured using pressure transducers and recorded by automated data loggers. The monitoring period for each well was 72 hours, with a predicted peak tidal cycle occurring midway through the period, except for the fifth round of tidal monitoring. The monitoring period for the fifth round of tidal monitoring was 25 hours because it was conducted during the facility-wide groundwater level measurement. The water levels and barometric pressure were recorded every 15 minutes during each monitoring period. During the first and second rounds of tidal influence monitoring, groundwater samples were also collected from the monitoring wells and the tidal station and analyzed for TDS and salinity after tidal monitoring was completed.

1.2 DATA EVALUATION

This section discusses the data evaluation techniques used to evaluate water levels and TDS and salinity data.

1.2.1 Water Level Data

Water level changes observed at monitoring well locations may have been caused by one or more processes, including direct tidal influence, sanitary sewer pumping, Bay water infiltration, storm drain and sewer system leakage, rainfall infiltration, and barometric pressure changes.

Water level data were evaluated by constructing hydrographs for each monitoring location, then comparing them to hydrographs of the tidal data. To examine the degree of water level fluctuation at each monitoring location, maximum fluctuations were estimated by calculating the difference between the maximum and minimum water levels recorded during the monitoring periods.

The results of the evaluation are further discussed in Section 1.3 and are shown in Figure 3.8-7 of the RI report. Figure 3.8-7 shows the approximate zone of tidal influence. This zone is generally defined as the inland area with an observed A-aquifer groundwater level change of approximately 0.5 foot or greater in response to tidal level changes in the Bay.

1.2.2 Total Dissolved Solids and Salinity Data

Analytical results for TDS and salinity are presented in Table C-2. TDS concentrations in groundwater in the A-aquifer are presented in Figure 3.8-8.

TDS and salinity concentrations can be used as general indicators of tidal influence of Bay water intrusion. The analytical results were evaluated with respect to water level data and the proximity of the sampling locations to the Bay. Areas in which TDS concentrations exceeded 10,000 milligrams per liter (mg/L) or salinity exceeded about 10 parts per thousand (ppt) were considered areas of more pronounced tidal influence.

1.3 RESULTS AND CONCLUSIONS

The maximum water level change, TDS concentration, and salinity recorded at each monitoring well and tidal monitoring station are presented in Figure 3.8-7 of the RI report. These maximum water level fluctuations represent the observed maximum changes in water levels over the 25- or 72-hour monitoring periods. Consequently, water level changes measured in monitoring wells indicate changes due to tidal influences and other factors, such as rainfall infiltration, pumping from sanitary sewers, and barometric pressure changes. The hydrographs were constructed to show the relationship, if any, between the groundwater level and the tidal influence at each monitoring well or tidal monitoring location.

Tidal influence was observed in a number of wells near the Bay. These wells are shown within the shaded area in Figure 3.8-7. This influence is reflected by a sinusoidal fluctuation in water level elevation in a well plotted over time (hydrograph). The hydrograph for each monitoring well is included in Attachment C1.

The TDS in groundwater samples ranged from 109 mg/L inland to 77,000 mg/L near the Bay (see Table C-2). The salinity concentrations ranged from 0.28 ppt inland to 31 ppt near the Bay. Both the TDS and salinity concentrations generally decrease with increasing distance from the Bay. In general, TDS concentrations exceeding 10,000 mg/L or salinity exceeding 10 ppt may indicate Bay water mixing with groundwater. The TDS and salinity concentrations of samples collected from the tidal monitoring station ranged from 23,000 to 35,000 mg/L and 21 to 27 ppt, respectively. According to the U.S. Geological Survey (USGS 1996), the salinity of South San Francisco Bay varies annually, seasonally, and spatially, but ranges from about 15 to 30 ppt and averages about 27.5 ppt (27,500 mg/L) in the vicinity of HPS.

Based on water level fluctuations and TDS data, tidal influence is generally limited to areas less than 300 to 500 feet from the Bay.

2.0 AQUIFER TESTING

A total of 77 slug tests (69 for the A-aquifer, six for the B-aquifer, and two for the bedrock water-bearing zone) and 14 constant-rate aquifer pumping tests (13 for the A-aquifer and one for the B-aquifer) were conducted at Parcel E by Harding Lawson Associates (HLA) and Levin-Fricke Recon (LFR). Monitoring wells installed before March 1995 were generally slug tested by HLA, and monitoring wells installed after March 1995 were generally tested by LFR. HLA and PRC used the computer software AQTESOLV (GMMG 1994) to analyze slug test data. HLA conducted nine constant-rate pumping tests, and LFR conducted five constant-rate pumping tests. Although HLA used different software than that used by LFR to analyze the constant-rate pumping test data, the analytical methodologies were similar.

Constant-rate pumping test results generally provide more reliable estimates of hydraulic properties than slug test results. Slug test results provide better spatial distribution estimates of aquifer properties at HPS because many more slug tests were performed over a larger area than constant-rate pumping tests. Also, constant-rate pumping tests provide estimates of pumping rates, drawdown, hydraulic conductivity, transmissivity, and storativity. Slug tests provide only hydraulic conductivity and transmissivity estimates.

Field methods, analytical methods, and test results are discussed in the following sections.

2.1 FIELD METHODS

Field methods used by HLA are detailed in the Phase I Aquifer Testing Results (HLA 1991b). Field methods used by LFR to conduct the slug and constant-rate pumping tests are discussed in the following sections.

2.1.1 Slug Testing

The slug tests were performed by lowering a submersible pump into the water column in a monitoring well and allowing the water level to equilibrate. The pump was activated by rapidly pumping 3 to 5 gallons of water from the monitoring well. The pump was then shut off and the water level in the well was monitored until the water level in the well recovered to at least 85 percent of the pretest level using pressure transducers and data loggers. The water level and time data were then downloaded from the data loggers to magnetic disks for analysis.

2.1.2 Constant-Rate Pumping Testing

During the aquifer pumping tests, background fluctuation was also monitored . This monitoring consisted of recording the water level elevations for at least 24 hours in pumping and observation wells to evaluate fluctuations from tidal influences, barometric pressure changes, and regional trends before conducting the pumping tests.

Step-drawdown tests were performed before the constant-rate pumping tests by pumping the wells at increasing discharge rates until the maximum capacities of the wells or pumps were reached. Water level, time, and discharge-rate data from these tests were used to evaluate suitable pumping rates for the constant-rate pumping tests and, if necessary, to evaluate monitoring well efficiencies. After the step-drawdown test, the water level in the pumped monitoring well was allowed to recover to within 90 percent of its pretest water level before the constant-rate pumping test began.

Constant-rate discharge tests were performed by pumping selected monitoring wells and monitoring water level drawdown and recovery in the pumping and observation monitoring wells. The pumping period for each test was 24 hours unless the monitoring well was unable to sustain a constant-discharge rate of at least 0.5 gallon per minute. Water levels in a minimum of two observable wells were monitored during each test. After the pumping portion of the test was completed, the pump was stopped and water level recovery in the pumping and observation wells was monitored for at least 24 hours or until the water level returned to at least 90 percent of the pretest level.

The pumping rates were monitored using an inline flow meter and a totalizer that were checked using a graduated bucket and stop watch. Water level monitoring data were recorded by pressure transducers and data loggers. After testing, the water level, time, and discharge-rate data were downloaded from the data loggers to magnetic disks for analysis. Discharge water was contained and tested for analytes as required by the City of San Francisco Department of Public Works, Division of Industrial Waste. Discharge water was discharged to the sanitary sewer at HPS Pump Station A after laboratory results indicated the permissibility of discharge.

2.2 ANALYTICAL METHODS

This section describes the methods used to analyze data from all the slug and constant-rate pumping tests, including the assumptions of these analytical methods. Although the assumptions were sometimes technically violated, the slug test and constant-rate pumping tests provide results acceptable for the purposes of an RI.

2.2.1 Slug Testing

Slug test data were analyzed using the method developed by Bouwer and Rice (Bouwer and Rice 1976). The assumptions for these analytical methods are listed below.

- The aquifer is unconfined and the monitoring well is fully or partially penetrating the aquifer
- A known volume of water is instantaneously withdrawn from the monitoring well.

The Bouwer and Rice method was selected because it is commonly used and accepted in the scientific community and the assumptions were met for the hydrogeology at Parcel E.

Data were analyzed using AQTESOLV, an interactive computer program that allows the user to fit to the theoretical aquifer response the observed data (GMMG 1994).

2.2.2 Constant-Rate Pumping Testing

Many methods were used to analyze the constant-rate pumping test data. Methods of analyses include those by Theis (1935), Cooper and Others (1967), Cooper and Jacob (1946), and distance-drawdown analyses. These methods are based on the nonequilibrium equation. The equation's major assumptions are summarized below.

- The aquifer is homogeneous, isotropic, of uniform thickness, confined, and of infinite areal extent.
- The well is pumped at a constant discharge rate.
- The pumped well penetrates the entire aquifer, and flow is horizontal within the aquifer to the well.
- The well diameter is infinitesimal so that storage within the well can be neglected.
- Water removed from the aquifer is discharged instantaneously with declining water levels.

The nonequlibrium equation was applied to aquifer conditions at HPS; however, the extreme heterogeneity of the Artificial Fill materials and partially penetrating wells violate several assumptions. Despite the limitations of the nonequilibrium equation, valid estimates of aquifer hydraulic properties can be obtained by simplifying the assumptions as follows:

- The aquifer is homogeneous, isotropic, and of uniform thickness for the interval screened by the pumping well. This assumption enables estimation of composite hydraulic properties for all saturated lithologies in which the pumping and observation wells are screened.
- The pumping wells fully penetrate the interval contributing water to the well. This assumption is based on the fact that horizontal hydraulic conductivities are generally much greater than vertical hydraulic conductivities; therefore, the flow induced by the pumping well is primarily horizontal.
- The aquifer is confined. This assumption is valid because drawdowns at variable pump rates are generally less than 10 percent of the saturated thickness of the aquifer.

The constant-rate pumping test data were analyzed using the drawdown and recovery methods of Cooper and Others (1967), Cooper and Jacob (1946), and Theis (1935). These first two methods fit a type curve to drawdown data, whereas the Theis recovery method is a straight-line, data-matching technique that uses residual drawdown data. Data analysis for the prementioned methods were analyzed using AQTESOLV, a computer program that allows the user to interactively fit the observed data to the theoretical aquifer response, with the exception of distance-drawdown methods (GMMG 1994). These methods are considered appropriate to analyze the drawdown and recovery data when the simplifying assumptions are applied.

Before the data were analyzed, the observed background water levels were evaluated to determine whether corrections for external influences not related to pumping were necessary. These influences include tidal influences and tidal flooding of storm drains, barometric pressure changes, and undirectional water level trends, which are rises or drops in water levels resulting from natural recharge or discharge from the aquifer.

2.3 TEST RESULTS

This section presents the results of and conclusions drawn from slug and constant-rate pumping tests at Parcel E.

2.3.1 Slug Testing

The Bouwer and Rice method directly estimates hydraulic conductivity, which can be converted to transmissivity by multiplying the conductivity by the saturated aquifer thickness. The results of slug tests conducted at Parcel E are summarized in Table C-3.

The estimated hydraulic conductivity in the A-aquifer at Parcel E ranges from 0.094 to 325 feet per day (see Table C-3). These values are in the range of values for silty sand, fine- to coarse-grained sand, and gravel (Heath 1987). The calculated transmissivity in the A-aquifer at Parcel E ranges from 1 to 6,172 square feet per day (see Table C-3). Hydraulic conductivity and transmissivity range over several orders of magnitude, indicating that the aquifer matrix is very heterogeneous. This result is consistent with the lithology of the A-aquifer. The A-aquifer consists primarily of Artificial Fill (including landfill), which is heterogeneous and varies from clay to silt to sand to gravel to boulder.

The calculated hydraulic conductivity in the B-aquifer ranges from 0.83 to 6.69 feet per day. The calculated transmissivity in the B-aquifer at Parcel E ranges from 65 to 701 square feet per day (see Table C-3). These values are in the range of silty sand and clean the sand (Heath 1987), which is consistent with the lithology of the B-aquifer.

The calculated hydraulic conductivity in the bedrock water-bearing zone was estimated from the two slug test results at 0.12 and 0.34 feet per day (see Table C-3). The transmissivity was not calculated because of the saturated thickness of the bedrock water-bearing zone is unknown.

2.3.2 Constant-Rate Pumping Testing

The hydraulic conductivity, transmissivity, and storativity values estimated based on the pumping test data are summarized in Table C-4. Figures show that the curve-matching for these pumping tests are included in Attachment C2.

The hydraulic conductivity for the A-aquifer ranges from 3.4 to 1,440 feet per day. The calculated hydraulic conductivity values based on pumping test results are in the range of values for silty sand and fine-grained to coarse-grained sand and gravel (Heath 1987), indicating that the Artificial Fill that comprises the A-aquifer is very heterogeneous at Parcel E. The calculated transmissivity for the A-aquifer ranges from 44 to 15,900 square feet per day. The calculated storativity for the A-aquifer ranges from 0.003 to 0.42 (see Table C-4). Most calculated storativity values correspond to the storativity values for unconfined aquifers (0.02 to 0.3) (Fetter 1988).

Based on one pumping test conducted at the B-aquifer monitoring well (IR01MW53B), the estimated hydraulic conductivity of the B-aquifer is 14 feet per day, and the estimated transmissivity is 150 square feet per day. The storativity is not estimated because no observation well was used during this pumping test. Further pumping test information for the B-aquifer was obtained from IR01MW02B. Because the A- and B-aquifers are in direct hydraulic communication where the Bay Mud is absent, the B-aquifer monitoring well IR01MW02B was used as an observation well during a constant-rate pumping test conducted at an A-aquifer monitoring well (IR01MW03A). The estimated hydraulic conductivity for the B-aquifer ranges from 11.7 to 14.8 feet per day, and transmissivity ranges from 199 to 251 square feet per day, based on the water-level drawdown and recovery observed at monitoring well IR01MW02B during the pumping test.

No pumping tests were conducted in the monitoring wells screened in the bedrock water-bearing zone.

TABLE C-1

MONITORING WELLS USED FOR TIDAL INFLUENCE MONITORING
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Monitoring Well	Tidal Influence Monitoring Date				
	First Round	Second Round	Third Round	Fourth Round	Fifth Round
IR01MW02B	11/91	02/92	NC	NC	NC
IR01MW07A	11/91	02/92	NC	NC	NC
IR01MW16A	NC	NC	NC	03/96	NC
IR01MW17B	NC	NC	NC	03/96	NC
IR01MW18A	NC	NC	NC	03/96	NC
IR01MW366A	NC	NC	NC	03/96	NC
IR01MW43A	11/91	02/92	NC	NC	NC
IR01MW48A	11/91	02/92	NC	NC	04/96
IR01MW53B	11/91	02/92	NC	03/96	04/96
IR01MW58A	11/91	02/92	NC	NC	NC
IR01MWI-3	NC	NC	NC	03/96	NC
IR02MW89A	NC	NC	NC	03/96	NC
IR02MW114A1	NC	02/92	03/93	03/96	NC
IR02MW179A	11/91	03/92	NC	02/96	04/96
IR02MW209A	11/91	03/92	NC	NC	NC
IR02MW300A	NC	NC	NC	02/96	NC
IR02MW372A	NC	NC	NC	03/96	NC
IR02MW97A	NC	NC	NC	02/96	NC
IR02MWB-1	10/91	02/92	NC	NC	NC
IR02MWB-2	10/91	02/92	NC	03/96	NC
IR02MWB-3	11/91	02/92	NC	NC	NC
IR02MWC5-W	10/91	02/92	NC	NC	NC
IR03MW218A1	11/91	03/92	NC	NC	NC

TABLE C-1 (Continued)

MONITORING WELLS USED FOR TIDAL INFLUENCE MONITORING
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Monitoring Well	Tidal Influence Monitoring Date				
	First Round	Second Round	Third Round	Fourth Round	Fifth Round
IR03MW218A2	NC	NC	NC	02/96	04/96
IR03MW218A3	11/91	03/92	NC	NC	NC
IR03MW224A	NC	NC	NC	02/96	NC
IR03MW228B	11/91	03/92	NC	02/96	NC
IR03MW370A	NC	NC	NC	02/96	NC
IR04MW38A	11/91	02/92	NC	NC	NC
IR04MW40A	11/91	02/92	03/93	NC	NC
IR05MW74A	10/91	02/92	NC	NC	NC
IR05MW77A	10/91	02/92	NC	NC	NC
IR11MW26A	11/91	03/92	NC	NC	NC
IR12MW12A	11/91	02/92	NC	NC	NC
IR12MW14A	11/91	02/92	NC	NC	NC
IR13MW10A	10/91	02/92	NC	NC	NC
IR13MW12A	10/91	02/92	NC	NC	NC
IR14MW10A	11/91	03/92	NC	NC	NC
IR15MW10F	NC	NC	NC	02/96	NC
PA39MW02A	NC	NC	NC	02/96	NC

Note:

NC Not conducted

TABLE C-2

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-01/21	IR01MW02B	11/25/91	B	1,200	0.79
		02/04/92		1,600	1.2
		01/17/92		1,180	NA
		08/17/92		1,290	NA
	IR01MW03A	01/10/92	A	1,730	NA
		08/17/92		1,675	NA
	IR01MW05A	05/05/92	A	1,595	NA
		07/23/92		1,510	NA
		08/17/92		1,020	NA
	IR01MW07A	03/26/91	A	747	NA
		11/25/91		1,600	0.98
		01/10/92		879	NA
		02/04/92		945	0.61
		08/17/92		1,410	NA
	IR01MW16A	05/05/92	A	1,480	NA
		07/22/92		4,255	NA
		08/18/92		4,300	NA
	IR01MW17B	01/28/92	B	1,500	NA
		07/22/92		1,400	NA
		08/18/92		1,510	NA
	IR01MW18A	05/06/92	A	905	NA
		07/23/92		1,880	NA
		08/18/92		1,730	NA
	IR01MW26B	01/17/92	B	2,925	NA
		08/19/92		3,080	NA
	IR01MW31A	05/08/92	A	2,250	NA
		07/22/92		2,330	NA
		08/19/92		2,350	NA

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-01/21 (Continued)	IR01MW367A	05/14/96	A	3,730	3.4
	IR01MW38A	01/16/92	A	2,245	NA
		08/18/92		2,400	NA
	IR01MW400A	09/12/96	A	1,780	1.6
		10/15/96		1,935	1.7
		11/14/96		1,950	1.8
	IR01MW401A	07/08/96	A	2,280	2.3
		09/12/96		2,310	2.2
		11/14/96		2,240	2.0
	IR01MW402A	06/28/96	A	3,810	3.4
		09/03/96		3,835	3.75
		11/14/96		5,950	4.3
	IR01MW403A	07/01/96	A	1,650	1.4
		09/03/96		3,110	2.7
		11/15/96		2,530	2.3
	IR01MW42A	01/09/92	A	12,150	NA
		07/09/92		10,100	NA
		08/18/92		11,000	NA
	IR01MW43A	11/22/91	A	8,200	7.0
		03/22/91		4,360	NA
		01/09/92		4,000	NA
		02/04/92		77,000	6.7
		08/18/92		3,365	NA
		03/19/96		2,390	2.2
	IR01MW44A	03/25/91	A	722	NA
		01/20/92		995	NA
		08/20/92		1,395	NA
		03/19/96		1,170	0.91

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-01/21 (Continued)	IR01MW47B	01/27/92	B	3,330	NA
		07/20/92		3,420	NA
		08/20/92		3,170	NA
	IR01MW48A	11/22/91	A	5,500	5.2
		01/22/92		5,745	NA
		02/04/92		5,400	5.0
		07/09/92		5,150	NA
		08/19/92		5,770	NA
	IR01MW53B	11/25/91	B	NA	2.0
		01/22/92		2,770	NA
		02/04/92		2,500	2.3
		08/20/92		2,920	NA
	IR01MW58A	03/25/91	A	4,300	NA
		11/22/91		5,050	4.95
		01/20/92		4,385	NA
		02/04/92		5,100	4.8
		08/20/92		3,400	NA
	IR01MW62A	01/21/92	A	9,000	NA
		07/21/92		11,800	NA
		08/20/92		14,600	NA
	IR01MW63A	01/22/92	A	15,500	NA
		07/20/92		15,200	NA
		08/20/92		16,500	NA
	IR01MWI-3	01/16/92	A	3,300	NA
		07/06/92		3,250	NA
		08/24/92		3,120	NA
		03/19/96		2,680	2.4

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-01/21 (Continued)	IR01MWI-5	01/16/92	A	3,070	NA
		07/09/92		2,930	NA
		08/21/92		2,800	NA
	IR01MWI-6	01/20/92	A	960	NA
		07/09/92		3,910	NA
		08/21/92		4,070	NA
	IR01MWI-7	01/21/92	A	23,600	NA
		07/10/92		24,900	NA
		08/21/92		20,900	NA
	IR01MWI-8	01/27/92	A	28,600	NA
		08/21/92		34,200	NA
		03/21/96		15,100	12.6
	IR01MWI-9	01/21/92		3,700	NA
		07/06/92		2,670	NA
		08/21/92		2,835	NA
IR-02 Central	IR02MW101A1	01/07/92	A	31,550	NA
		07/08/92		2,280	NA
		08/24/92		2,640	NA
	IR02MW101A2	01/08/92	A	13,800	NA
		07/09/92		15,500	NA
		08/25/92		14,400	NA
	IR02MW114A1	01/15/92	A	2,920	NA
		02/21/92		2,400	1.4
		07/07/92		2,350	NA
		08/27/92		2,760	NA
		03/08/93		2,300	6.3
	IR02MW114A2	07/10/92	A	4,490	NA
		01/13/92		3,390	NA
		08/25/92		4,370	NA

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-02 Central (Continued)	IR02MW114A3	01/14/92	A	12,100	NA
		07/08/92		15,800	NA
		08/26/92		12,400	NA
	IR02MW147A	01/15/92	A	21,600	NA
		07/10/92		26,200	NA
		08/25/92		24,000	NA
	IR02MW149A	03/21/91	A	18,500	NA
		01/10/92		15,200	NA
		08/25/92		20,000	NA
	IR02MW298A	07/08/92	A	5,080	NA
		08/27/92		5,830	NA
		03/22/96		1,200	0.89
	IR02MW89A	01/22/92	A	824	NA
		07/21/92		795	NA
		08/24/92		895	NA
	IR02MW93A	03/22/91	A	2,820	NA
		01/06/92		2,795	NA
		08/24/92		2,010	NA
	IR02MWB-1	10/25/91	A	19,000	13.0
		01/13/92		16,800	NA
		02/21/92		17,000	13.5
		07/07/92		19,050	NA
		08/27/92		19,000	NA
	IR02MWB-2	10/25/91	A	20,000	24.0
		01/07/92		30,300	NA
		02/21/92		10,950	9.15
		07/07/92		31,400	NA
		08/27/92		30,800	NA

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-02 Central (Continued)	IR02MWC5-W	10/25/91	A	9,400	8.8
		02/21/92		9,500	8.8
	PA39MW03A	03/20/96	A	857	0.76
		05/23/96		868	0.70
IR-02 Northwest	IR02MW126A	01/06/92	A	29,700	NA
		07/08/92		5,170	NA
		08/25/92		6,000	NA
	IR02MW127B	01/28/92	B	6,010	NA
		07/21/92		5,820	NA
		08/26/92		5,400	NA
	IR02MW141A	05/07/92	A	5,470	NA
		07/21/92		8,810	NA
		08/25/92		9,475	NA
	IR02MW372A	05/10/96	A	2,010	1.8
	IR02MW373A	05/10/96	A	1,190	0.77
	IR02MWB-3	11/25/91	A	14,000	11.0
		01/20/92		22,100	NA
		02/04/92		20,000	18.0
		07/10/92		8,880	NA
		08/27/92		13,450	NA
IR-02 Southeast	IR02MW175A	01/04/92	A	30,200	NA
		07/10/92		28,550	NA
		08/25/92		33,000	NA
	IR02MW179A	11/07/91	A	32,000	24.0
		01/14/92		27,400	NA
		03/18/92		23,000	20.0
		06/09/92		30,600	NA
		08/25/92		34,200	NA

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-02 Southeast (Continued)	IR02MW183A	01/14/92	A	14,950	NA
		06/09/92		20,800	NA
		08/26/92		18,300	NA
	IR02MW196A	03/21/91	A	13,950	NA
		01/08/92		11,800	NA
		08/26/92		10,200	NA
	IR02MW206A1	01/08/92	A	26,700	NA
		06/09/92		31,300	NA
		08/25/92		34,600	NA
	IR02MW206A2	01/08/92	A	30,600	NA
		06/08/92		30,800	NA
		08/26/92		32,600	NA
	IR02MW209A	11/07/91	A	33,500	24.5
		01/08/92		31,850	NA
		03/18/92		29,000	25.5
		06/08/92		31,250	NA
		08/26/92		32,000	NA
	IR02MW300A	07/06/92	A	30,100	NA
		08/26/92		32,600	NA
		03/20/96		12,700	10.4
IR-03	IR02MW146A	01/30/92	A	30,900	NA
		03/26/96		20,100	31.8
		05/29/96		19,950	13.85
	IR02MW173A	01/29/92	A	28,200	NA
		03/26/96		19,800	16.6
		05/30/96		18,800	18.2
	IR02MW210B	01/30/92	B	24,800	NA
		07/21/92		17,000	NA
		08/26/92		23,100	NA

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-03 (Continued)	IR02MW299A	07/06/92	A	6,030	NA
		08/26/92		8,350	NA
		03/21/96		988	0.82
	IR02MW97A	03/21/91	A	16,700	NA
		01/15/92		19,700	NA
		08/24/92		20,950	NA
	IR02MWB-5	01/21/92	A	25,200	NA
		06/09/92		25,100	NA
		08/28/92		23,000	NA
	IR03MW218A1	11/07/91	A	17,000	14.0
		01/24/92		8,265	NA
		03/18/92		3,600	2.7
		07/09/92		8,520	NA
	IR03MW218A2	01/15/92	A	21,100	NA
		06/09/92		22,600	NA
		08/27/92		21,800	NA
	IR03MW218A3	11/07/91	A	23,000	18.0
		01/16/92		23,900	NA
		03/18/92		22,000	20.0
		07/09/92		21,100	NA
		08/27/92		22,600	NA
	IR03MW224A	01/23/92	A	29,600	NA
		07/24/92		26,200	NA
		08/28/92		27,700	NA
	IR03MW225A	01/28/92	A	25,000	NA
		04/03/96		22,700	18.5
		06/19/96		22,400	19.9

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-03 (Continued)	IR03MW226A	01/27/92	A	6,460	NA
		07/24/92		14,250	NA
		08/27/92		13,200	NA
	IR03MW228B	11/07/91	B	675	0.46
		01/16/92		532	NA
		03/18/92		450	0.37
		08/28/92		432	NA
	IR03MW342A	07/06/92	A	28,200	NA
		08/28/92		25,200	NA
		03/21/96		7,770	7.45
	IR03MW369A	05/20/96	A	18,700	16.3
	IR03MW370A	05/16/96	A	20,800	13.2
	IR03MW371A	05/16/96	A	21,000	15.6
	IR03MWO-1	01/23/92	A	16,700	NA
		07/09/92		18,800	NA
		08/28/92		18,700	NA
IR-04	IR01MW09B	01/23/92	B	1,870	NA
		07/23/92		1,920	NA
		08/17/92		2,010	NA
	IR01MW366A	05/15/96	A	2,060	1.2
	IR01MWI-2	01/09/92	A	3,670	NA
		07/06/92		3,370	NA
		08/21/92		3,360	NA
	IR04MW09A	02/13/92	A	870	NA
		06/15/92		981	NA
	IR04MW13A	02/12/92	A	3,385	NA
		06/17/92		3,305	NA
	IR04MW31A	02/12/92	A	3,670	NA
		06/17/92		3,100	NA

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-04 (Continued)	IR04MW35A	02/12/92	A	1,440	NA
		06/15/92		7,080	NA
	IR04MW36A	02/13/92	A	1,200	NA
		06/17/92		1,490	NA
	IR04MW38A	11/25/91	A	1,200	0.86
		01/17/92		922	NA
		02/04/92		1,000	0.97
		02/14/92		1,150	NA
	IR04MW39A	02/13/92	A	1,410	NA
		06/15/92		1,490	NA
	IR04MW40A	11/25/91	A	17,000	15.0
		02/04/92		20,000	17.0
		02/13/92		7,530	NA
		06/17/92		10,600	NA
		03/19/93		1,930	5.0
IR-05	IR05MW73A	02/11/92	A	4,680	NA
		06/19/92		4,690	NA
	IR05MW74A	10/25/91	A	9,000	7.75
		02/11/92		9,200	NA
		02/21/92		8,500	8.0
		06/18/92		8,370	NA
	IR05MW76A	02/11/92	A	3,520	NA
		06/19/92		2,445	NA
	IR05MW77A	10/25/91	A	5,700	4.1
		02/10/92		8,760	NA
		02/21/92		8,100	7.2
		06/18/92		8,930	NA
	IR05MW82A	02/11/92	A	4,650	NA
		06/18/92		4,960	NA

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-05 (Continued)	IR05MW85A	06/18/92	A	3,165	NA
		07/24/92		3,130	NA
		03/21/96		2,380	2.2
IR-11/14/15	IR11MW25A	08/23/90	A	31,809	NA
	IR11MW26A	08/21/90	A	6,130	NA
		03/17/92		3,200	2.7
		09/17/92		3,880	NA
	IR11MW27A	08/21/90	A	7,750	NA
	IR14MW09A	11/27/91	A	14,750	NA
		02/26/92		8,735	NA
	IR14MW10A	11/07/91	A	14,000	11.0
		11/22/91		19,900	NA
		02/26/92		9,280	NA
		03/17/92		8,000	7.3
	IR14MW12A	11/20/91	A	8,800	NA
		02/26/92		9,400	NA
		09/16/92		18,700	NA
	IR14MW13A	09/23/92	A	3,820	NA
		04/02/96		1,970	1.8
		05/09/96		1,730	1.6
	IR15MW06A	11/20/91	A	4,220	NA
		02/27/92		3,530	NA
	IR15MW07A	11/20/91	A	5,865	NA
		02/27/92		3,375	NA
		09/16/92		8,580	NA
	IR15MW08A	09/24/92	A	2,790	NA
		03/28/96		1,840	1.5
	IR15MW09F	09/22/92	A	2,590	NA
		03/27/96		2,140	1.7

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-11/14/15 (Continued)	IR15MW10F	09/22/92	A	7,280	NA
		03/27/96		7,480	6.3
IR-12	IR02MW87A	03/26/91	A	2,300	NA
		01/06/92		2,200	NA
		08/24/92		1,750	NA
	IR12MW11A	02/24/92	A	1,800	NA
		03/22/96		1,770	1.5
	IR12MW12A	11/25/91	A	600	0.4
		02/04/92		435	0.39
		02/24/92		549	NA
		09/21/92		997	NA
	IR12MW13A	02/24/92	A	1,230	NA
		09/22/92		3,925	NA
	IR12MW14A	11/25/91	A	1,200	0.77
		02/04/92		1,000	0.86
		02/25/92		10,600	NA
		09/22/92		1,800	NA
	IR12MW15A	02/25/92	A	2,730	NA
		09/18/92		3,170	NA
	IR12MW16A	02/25/92	A	3,850	NA
		09/24/92		7,400	NA
	IR12MW17A	09/24/92	A	2,290	NA
		03/22/96		1,270	1.1
	IR12MW18A	09/24/92	A	3,210	NA
		03/25/96		1,755	1.55
	IR12MW19A	09/25/92	A	5,305	NA
		03/25/96		2,640	2.3
	IR12MW20A	09/25/92	A	2,900	NA
		03/25/96		1,210	1.1

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-12 (Continued)	IR12MW21A	09/23/92	A	9,980	NA
		04/02/96		4,390	4.2
		05/02/96		4,080	3.9
IR-13	IR13MW10A	10/25/91	A	21,000	17.0
		02/21/92		20,000	17.0
		02/25/92		23,350	NA
		09/18/92		35,700	NA
	IR13MW11A	02/26/92	A	3,230	NA
		09/17/92		6,515	NA
	IR13MW12A	10/25/91	A	26,000	20.0
		02/21/92		3,600	2.7
		02/26/92		2,970	NA
		09/18/92		15,305	NA
	IR39MW33A	03/29/96	A	8,870	8.3
	IR39MW36A	03/18/96	A	6,290	5.5
	PA50MW09A	03/21/96	A	2,540	1.0
		05/02/96		109	0.01
IR-38	IR08MW40A	07/10/90	A	14,950	NA
		01/04/91		18,700	NA
		07/10/91		17,700	NA
		11/07/91		17,000	0.02
		12/19/91		17,950	NA
		03/17/92		17,000	0.02
	IR08MW41A	07/11/90	A	7,390	NA
		01/04/91		2,360	NA
		07/11/91		11,400	NA
		11/07/91		19,000	0.02
		12/19/91		14,600	NA
		03/17/92		13,500	0.01

TABLE C-2 (Continued)

ANALYTICAL RESULTS FOR TDS AND SALINITY AT PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Sampling Date	Aquifer	TDS Result (mg/L)	Salinity Result (ppt)
IR-39	IR36MW135A	03/15/96	A	1,200	1.2
IR-50	IR50MW10A	10/15/96	A	1,580	1.4
		11/14/96		21,250	18.45
IR-50A	PA50MW08A	03/13/96	A	1,690	1.58
IR-56	IR72MW33A	05/15/96	A	603	0.46
	IR74MW01A	07/12/96	A	684	0.57
		09/04/96		608	0.45
		11/15/96		721	0.61
IR-72	IR04MW37A	02/14/92	A	1,065	NA
		06/15/92		1,075	NA
	IR56MW39A	05/15/96	A	749	0.57
	IR72MW32A	05/15/96	A	667	0.51
IR-73	IR73MW04A	05/13/96	A	1,905	4.05
IR-75	IR75MW05B	07/01/96	B	765	0.54
		09/03/96		867	0.65
		11/15/96		898	0.66
IR-76	IR76MW13A	07/12/96	A	492	0.31
		09/04/96		447	0.30
		11/15/96		440	0.28

Notes:

mg/L Milligrams per liter
NA Not available
ppt Parts per thousand
TDS Total dissolved solids

TABLE C-3

SUMMARY OF SLUG TESTING RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Type of Analysis: Bouwer and Rice — T (ft^2/day)	K (ft/day)	Hydrostratigraphic Unit
IR-01/21	IR01MW02B	65	1.3	Artificial Fill (well-graded sand)
	IR01MW03A	246	20	Artificial Fill (poorly-graded sand with clay, and landfill debris)
	IR01MW07A	178	24	Artificial Fill (sandy clay with gravel)
	IR01MW26B	97	0.90	Undifferentiated Upper Sand Deposits (well-graded sand with silt)
	IR01MW38A	16	1.2	Artificial Fill (sandy silt, well-graded gravel, and landfill debris)
	IR01MW42A	506	59	Artificial Fill (serpentinite gravel)
	IR01MW43A	77	5.4	Artificial Fill (sandy silt and well-graded sand)
	IR01MW48A	190	16	Artificial Fill (silty sand with gravel)
	IR01MW53B	701	4.43	Undifferentiated Sedimentary Deposits (silty and poorly-graded sand)
	IR01MW58A	32	3.4	Artificial Fill (sand, silty, and gravel)
	IR01MW367A	92	6.27	Artificial Fill and Undifferentiated Upper Sand Deposits (silty and poorly-graded sand, and gravel)
	IR01MW400A	187	14.83	Artificial Fill (silty sand and poorly-graded gravel)
	IR01MW401A	182	13.71	Artificial Fill and Undifferentiated Upper Sand Deposits (silty poorly- and well-graded sand)
	IR01MW402A	147	14.05	Artificial Fill (silty sand and well-graded gravel)
	IR01MW403A	1,734	30.76	Artificial Fill and Undifferentiated Upper Sand Deposits (silty and poorly-graded sand)
	IR01MWI-3	5	0.71	Artificial Fill (sand to gravelly sand)
	IR01MWI-5	115	11	Artificial Fill (clayey sand and landfill debris)
	IR01MWI-7	500	50	Bay Mud Deposits (silty clay)

TABLE C-3 (Continued)

SUMMARY OF SLUG TESTING RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Type of Analysis: Bouwer and Rice T (ft^2/day)	K (ft/day)	Hydrostratigraphic Unit
IR-01/21 (Continued)	IR01MWI-9	10	1.2	Artificial Fill (clayey sand)
	IR01P03AA	688	12.29	Artificial Fill (landfill debris)
IR-02 Central	IR02MW93A	594	53.0	Artificial Fill (clayey gravel with sand)
	IR02MW101A2	1	0.094	Artificial Fill (silty sand and gravel)
	IR02MW114A3	2	0.19	Artificial Fill (sandy clay with gravel)
	IR02MW149A	3	0.177	Artificial Fill (sandy clay)
	IR02MWB-1	6	0.41	Artificial Fill (silty clay)
IR-02 Northwest	IR02MWB-2	104	10	Artificial Fill (gravelly sand)
	IR02MW126A	48	8.2	Artificial Fill (poorly- and well-graded sand, silty, and gravel)
	IR02MW127B	205	0.83	Undifferentiated Sedimentary Deposits (poorly-graded sand with clay, and sandy clay)
	IR02MW372A	4	1.29	Artificial Fill (silty and well-graded sand)
	IR02MWB-3	67	6.89	Artificial Fill (gravelly sand, clayey gravel, and silty clay)
IR-02 Southeast	IR02MW175A	222	9.3	Artificial Fill and Undifferentiated Upper Sand Deposits (well-graded sand with gravel, and poorly-graded sand)
	IR02MW179A	88	3.73	Artificial Fill (poorly-graded sand and silty gravel)
	IR02MW183A	49	1.9	Artificial Fill and Undifferentiated Upper Sand Deposits (poorly-graded sand)
	IR02MW206A2	297	27	Artificial Fill and Undifferentiated Upper Sand Deposits (gravelly clay with sand and poorly-graded sand)
	IR02MW209A	312	22	Artificial Fill and Undifferentiated Upper Sand Deposits (silty sand)

TABLE C-3 (Continued)

SUMMARY OF SLUG TESTING RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Type of Analysis: Bouwer and Rice T (ft^2/day)	Type of Analysis: Bouwer and Rice K (ft/day)	Hydrostratigraphic Unit
IR-03	IR02MW97A	3,775	250	Artificial Fill and Undifferentiated Upper Sand Deposits (gravel and sand, and poorly-graded sand)
	IR03MW218A3	8	0.32	Artificial Fill and Undifferentiated Upper Sand Deposits (clay, minor gravel, and sand)
	IR03MW228B	293	3.1	Undifferentiated Sedimentary Deposits (silty clay and poorly-graded sand)
	IR03MW369A	377	27.94	Artificial Fill (gravel and sand)
	IR03MW370A	1,044	41.2	Artificial Fill (silty sand with gravel and silty gravel)
	IR03MW371A	50	8.06	Artificial Fill and Undifferentiated Upper Sand Deposits (poorly-graded gravel)
IR-04	IR01MW366A	2	0.14	Artificial Fill (silty sand with gravel)
	IR01MWI-2	625	69	Artificial Fill (clayey sand and sandy gravel)
	IR04MW09A	623	54	Artificial Fill (silt with gravel and boulder fill)
	IR04MW31A	181	11	Artificial Fill (clayey gravel with sand and gravel with silt)
	IR04MW35A	523	29.42	Artificial Fill (gravelly silt)
	IR04MW36A	209	130	Artificial Fill (gravelly silt and gravelly clay with sand)
	IR04MW37A	625	50	Artificial Fill (boulder fill)
	IR04MW38A	76	6.87	Artificial Fill (silt with gravel)
	IR04MW39A	111	7	Artificial Fill (gravelly silt to gravelly clay with sand)
	IR04MW40A	1,253	94	Artificial Fill (silty sand to sandy silt)
	PA50MW10A	2,182	94	Artificial Fill (sandy clay and poorly-graded sand)
IR-05	IR05MW74A	416	26	Artificial Fill (sand with silty and clayey gravel)
	IR05MW77A	133	5.7	Artificial Fill (clayey sand and sandy gravel)
IR-11/14/15	IR14MW10A	77	9.7	Artificial Fill (boulder fill)
	IR15MW09F	NA	0.34	Bedrock (fractured and weathered serpentinite)

TABLE C-3 (Continued)

SUMMARY OF SLUG TESTING RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Type of Analysis: Bouwer and Rice T (ft^2/day)	K (ft/day)	Hydrostratigraphic Unit
IR-11/14/15 (Continued)	IR15MW10F	NA	0.12	Bedrock (fractured and weathered serpentinite)
	IR15P08AB	426	21.9	Artificial Fill (poorly-graded and clayey gravel)
IR-12	IR12MW11A	113	12	Artificial Fill (gravelly silt, clayey gravel, poorly-graded gravel with sand)
	IR12MW12A	131	13	Artificial Fill (boulder fill)
	IR12MW13A	155	17	Artificial Fill (clayey gravel with sand and boulder fill)
	IR12MW14A	280	26	Artificial Fill (sandy silt and sandy clay with gravel)
	IR12MW15A	369	29	Artificial Fill (gravel, clay, sand, and silt mixture)
	IR12MW16A	268	9	Artificial Fill (sandy clay with gravel, and silty and sandy gravel)
IR-13	IR13MW10A	260	19	Artificial Fill (gravelly clay and clayey sand with gravel)
	IR13MW12A	590	46	Artificial Fill (gravel, clay, sand, and silt mixture)
IR-38	IR08MW40A	51	2.4	Artificial Fill and Undifferentiated Upper Sand Deposits (gravelly clay, boulder fill, and poorly-graded sand)
	IR08MW41A	840	46	Artificial Fill and Undifferentiated Upper Sand Deposits (silt, gravel, sandy clay, and poorly-graded sand)
IR-39	IR36MW11A	210	14	Artificial Fill (sandy clay with gravel and well-graded sand with gravel)
	IR36MW135A	750	37	Artificial Fill (poorly- to well-graded gravel)
IR-56	IR72MW33A	207	7.19	Artificial Fill (poorly- to well-graded gravel)
	IR74MW01A	6,172	324	Artificial Fill (silty gravel with sand)
IR-72	IR04MW32A	4,081	290	Artificial Fill (poorly- to well-graded gravel and silty sand with gravel)
	IR72MW37A	684	50	Artificial Fill (gravelly silt)

TABLE C-3 (Continued)

SUMMARY OF SLUG TESTING RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Well No.	Type of Analysis: Bouwer and Rice T (ft^2/day)	K (ft/day)	Hydrostratigraphic Unit
IR-75	IR75MW05B	NA	6.69	Undifferentiated Sedimentary Deposits (sand)
IR-76	IR76MW13A	106	6.88	Artificial Fill and Undifferentiated Upper Sand Deposits (sandy clay, and silty sand with gravel)

Notes:

ft/day	Feet per day
ft^2/day	Square feet per day
K	Hydraulic conductivity
NA	Not available (A-aquifer of bedrock water-bearing zone saturated thickness unknown)
T	Transmissivity

TABLE C-4

SUMMARY OF CONSTANT-RATE PUMPING TEST RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Pumping Test No.	Well No.[a]	Pumping Test Type	Type of Analysis	Method	Q[b] (gpm)	T[c] (ft^2/day)	S[d]	K[e] (ft/day)	Hydrostratigraphic Unit
IR-01/21	1	IR01MW03A (P)	Drawdown	C-J	AQTESOLV	4.25	48.6	NA	3.4	Clay to gravel fill/boulder
			Drawdown	Theis	AQTESOLV		44.2	NA	3.7	
			Recovery	Theis	AQTESOLV		328	NA	25.2	
		IR01MW02B (O)	Drawdown	C-J	AQTESOLV		251	0.012	14.8	Undifferentiated Sedimentary Deposits
			Drawdown	Theis	AQTESOLV		199	0.017	11.7	
			Recovery	Theis	AQTESOLV		354	NA	20.8	
		IR01P03A (O)	Drawdown	C-J	AQTESOLV		2,290	0.07	179	Landfill debris
			Drawdown	Theis	AQTESOLV		2,290	0.07	179	
			Recovery	Theis	AQTESOLV		2,460	NA	192	
		IR01P03AA (O)	Drawdown	C-J	AQTESOLV		6,880	0.17	623	Clay to gravel fill
			Drawdown	Theis	AQTESOLV		6,880	0.17	623	
			Recovery	Theis	AQTESOLV		15,900	NA	1,440	
		IR01P03AB (O)	Drawdown	C-J	AQTESOLV		6,410	0.14	526	Clay to gravel fill
			Drawdown	Theis	AQTESOLV		6,410	0.14	526	
			Recovery	Theis	AQTESOLV		9,560	NA	785	
	2	IR01MW53B (P)	Recovery	Theis	GWAP	10.5	150	NA	14	Undifferentiated Sedimentary Deposits
	3	IR01MW58A (P)	Recovery	Theis	GWAP	5.5	970	NA	80	Silt to gravel fill

TABLE C-4 (Continued)

SUMMARY OF CONSTANT-RATE PUMPING TEST RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Pumping Test No.	Well No.[a]	Pumping Test Type	Type of Analysis	Method	Q[b] (gpm)	T[c] (ft^2/day)	S[d]	K[e] (ft/day)	Hydrostratigraphic Unit
IR-02 Central	4	IR02MW93A (P)	Recovery	Theis	GWAP	6.5	5,200	NA	460	Clayey gravel with sand
		IR02P93AA (O)	Drawdown	Neuman	GWAP		2,900	0.018	260	Clay to gravel fill
			Recovery	Theis	GWAP		5,700	NA	510	Clay to gravel fill
		IR02P93AB (O)	Drawdown	Neuman	GWAP		2,500	0.0041	220	Silty gravel with sand fill
			Recovery	Theis	GWAP		4,600	NA	410	
IR-02 Northwest	5	IR02MW126A (P)	Recovery	Theis	GWAP	3.2	590	NA	86	Silt to gravel fill
IR-04	6	IR04MW31A (P)	Drawdown	C-J	AQTESOLV	1.5	67.5	NA	4.5	Silt to gravel fill
			Drawdown	Theis	AQTESOLV		67.5	NA	4.5	
			Recovery	Theis	AQTESOLV		54.9	NA	3.7	
		IR04P31AA (O)	Drawdown	C-J	AQTESOLV		85.8	0.05	5.9	Clay to gravel fill
			Drawdown	Theis	AQTESOLV		85.8	0.05	5.9	
			Recovery	Theis	AQTESOLV		71.3	NA	4.7	
		IR04P31AB (O)	Drawdown	C-J	AQTESOLV		79.8	0.004	4.3	
			Drawdown	Theis	AQTESOLV		74.2	0.003	4.0	
			Recovery	Theis	AQTESOLV		63.2	NA	3.4	
	7	IR04MW38A (P)	Recovery	Theis	GWAP	4.3	3,800	NA	340	Silt to gravel fill
		IR04P38A (O)	Recovery	Theis	GWAP		3,800	NA	340	
IR-05	8	IR05MW77A (P)	Recovery	Theis	GWAP	2.6	460	NA	18	Clayey sand to sandy gravel fill
		IR05P77A (O)	Drawdown	Neuman	GWAP		1,050	0.01	41	Clay to gravel fill
			Recovery	Theis	GWAP		1,000	NA	39	

TABLE C-4 (Continued)

SUMMARY OF CONSTANT-RATE PUMPING TEST RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Pumping Test No.	Well No.[a]	Pumping Test Type	Type of Analysis	Method	Q[b] (gpm)	T[c] (ft^2/day)	S[d]	K[e] (ft/day)	Hydrostratigraphic Unit
IR-05 (Continued)	8	IR05P77AB (O)	Drawdown	Nueman	GWAP	2.6	1,700	0.008	68	Sand to gravel fill
			Recovery	Theis	GWAP		920	NA	36	
IR-11/14/15	9	IR15MW08A (P)	Drawdown	C-J	AQTESOLV	17.5	196	NA	22.3	Sand to gravel fill
			Recovery	Theis	AQTESOLV		220	NA	25.1	
			Recovery	Theis	AQTESOLV		436	NA	49.7	
		IR15P08AA (O)	Drawdown	C-J	AQTESOLV		255	0.32	27.2	Boulder fill
			Drawdown	Theis	AQTESOLV		223	0.42	23.8	
		IR15P08AA (O)	Recovery	Theis	AQTESOLV		488	NA	52.5	
		IR15P08AB (O)	Drawdown	C-J	AQTESOLV		258	0.10	26.9	Gravel fill
			Drawdown	Theis	AQTESOLV		225	0.13	23.4	
			Recovery	Theis	AQTESOLV		504	NA	52.5	
		IR15MW06A (O)	Drawdown	C-J	AQTESOLV		980	0.08	117	Boulder fill
			Drawdown	Theis	AQTESOLV		629	0.11	75	
		IR14MW13A (O)	Drawdown	C-J	AQTESOLV		11,700	0.25	1,140	Sand to gravel fill
			Drawdown	Theis	AQTESOLV		6,570	0.35	637	
		IR02MW299A (O)	Drawdown	C-J	AQTESOLV		7,360	0.04	698	Sand to boulder fill
			Drawdown	Theis	AQTESOLV		4,620	0.05	437	

TABLE C-4 (Continued)

SUMMARY OF CONSTANT-RATE PUMPING TEST RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Pumping Test No.	Well No.[a]	Pumping Test Type	Type of Analysis	Method	Q[b] (gpm)	T[c] (ft^2/day)	S[d]	K[e] (ft/day)	Hydrostratigraphic Unit
IR-12	10	IR12MW12A (P)	Recovery	Theis	GWAP	3.0	1,300	NA	130	Boulder fill
		IR12P12AA (O)	Drawdown	Neuman	GWAP		3,300	0.18	320	Silt to gravel fill
			Recovery	Theis	GWAP		1,200	NA	120	
	10	IR12P12AB	Drawdown	Neuman	GWAP		2,100	0.14	200	Clay to gravel fill
			Recovery	Theis	GWAP		1,200	NA	120	
	11	IR12MW14A (P)	Recovery	Theis	GWAP	1.2	110	NA	10	Sandy clay to sandy silt fill
		IR12P14AB (O)	Drawdown	Neuman	GWAP		250	0.003	26	Clay to gravel fill
			Recovery	Theis	GWAP		210	NA	22	
IR-13	12	IR13MW12A (P)	Recovery	Theis	GWAP	5.4	19,000	NA	1,520	Clay to gravel fill
IR-56	13	IR72MW33A (P)	Drawdown	C-J	AQTESOLV	2.4	133	NA	11.9	Sand to gravel fill
			Drawdown	Theis	AQTESOLV		111	NA	9.9	
			Recovery	Theis	AQTESOLV		222	NA	19.9	
		IR72P33AA (O)	Drawdown	C-J	AQTESOLV		953	0.22	94.3	Silt to gravel fill
			Drawdown	Theis	AQTESOLV		799	0.30	79.1	
			Recovery	Theis	AQTESOLV		311	NA	30.8	
		IR72P33AB (O)	Drawdown	C-J	AQTESOLV		565	0.022	50.1	Gravel fill
			Drawdown	Theis	AQTESOLV		584	0.025	51.7	
			Recovery	Theis	AQTESOLV		186	NA	16.5	

TABLE C-4 (Continued)

SUMMARY OF CONSTANT-RATE PUMPING TEST RESULTS FOR PARCEL E
HUNTERS POINT SHIPYARD
PARCEL E REMEDIAL INVESTIGATION

Site No.	Pumping Test No.	Well No.[a]	Pumping Test Type	Type of Analysis	Method	Q[b] (gpm)	T[c] (ft^2/day)	S[d]	K[e] (ft/day)	Hydrostratigraphic Unit
IR-75	14	IR75MW05B (P)	Drawdown	C-J	AQTESOLV	1.3	182	NA	14.5	Undifferentiated Sedimentary Deposits
			Drawdown	Theis	AQTESOLV		181	NA	14.5	
			Recovery	Theis	AQTESOLV		439	NA	35.0	
		IR75P05AA (O)	Drawdown	C-J	AQTESOLV		216	0.003	18.6	Undifferentiated Sedimentary Deposits
			Drawdown	Theis	AQTESOLV		240	0.003	20.1	
			Recovery	Theis	AQTESOLV		180	NA	15.5	
		IR75P05AB (O)	Drawdown	C-J	AQTESOLV		420	0.003	37.4	Undifferentiated Sedimentary Deposits
			Drawdown	Theis	AQTESOLV		420	0.003	37.4	
			Recovery	Theis	AQTESOLV		369	NA	32.9	

Notes:

C-J	Cooper-Jacob method (1946)	GWAP	Graphical Well Analysis Package
ft/day	Feet per day	Neuman	Neuman method (1969)
ft^2/day	Square feet per day	O	Observation well
gpm	Gallons per minute	Theis	Theis method (1935)

a Monitoring wells with designation ending with "B" and IR07MWS-1 are screened in the B-aquifer; remaining monitoring wells are screened in the A-aquifer
b Average pumping rate
c Transmissivity
d Storativity
e Hydraulic conductivity

REFERENCES

Bouwer, H. and R.C. Rice. 1976. "A Slug Test to Determine Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells." *Water Resources Research.* Volume 12. Number 3.

Cooper, H.H Jr., J.D. Bredehoeft, and I.S. Papadopulos. 1967. "Response of a Finite-Diameter Well to an Instantaneous Charge of Water." *Water Resources Research.* Volume 3. Number 1.

Cooper, H.H Jr., and R.E. Jacob. 1946. "A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History." *Trans. American Geophysical Union.* Volume 27. Pages 326 through 534.

Fetter, C.W. 1988. "Applied Hydrogeology." Charles E. Merrill Publishing Company. Columbus, Ohio.

Garethy-Miller Modeling Group (GMMP). 1994. "AQTESOLV Aquifer Test Solver, Version 1.00 Documentation." October 17.

Harding Lawson Associates (HLA). 1991a. "Aquifer Testing Work Plan, Remedial Investigation/Feasibility Study, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California." October 22.

HLA. 1991b. "Phase I Aquifer Testing Results, Recommendations for Phase II Aquifer Testing. Naval Station Treasure Island, Hunters Point Annex, San Francisco, California." November 21.

Heath, Ralph C. 1987. "Basic Groundwater Water Hydrogeology." *U.S. Geological Survey Water Supply Paper 2220.*

Neuman, S.P. and P.A. Witherspoon. 1969. Theory of Flow in a Confined Two-Aquifer System. *Water Resources Research.* Volume 5. Pages 803 through 816.

Theis, C.V. 1935. "The Relation Between the Lowering of the Piezometer Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage." *Trans. American Geophysical Union.* Volume 16. Pages 519 through 524.

U.S. Geological Survey. 1996. "Work Plan for San Francisco Bay Estuary, Toxic Substance Study, FY1996-2000." Toxic Hydrogeology Program.

ATTACHMENT C1

HYDROGRAPHS FOR
TIDAL INFLUENCE MONITORING
ROUNDS 1 THROUGH 5

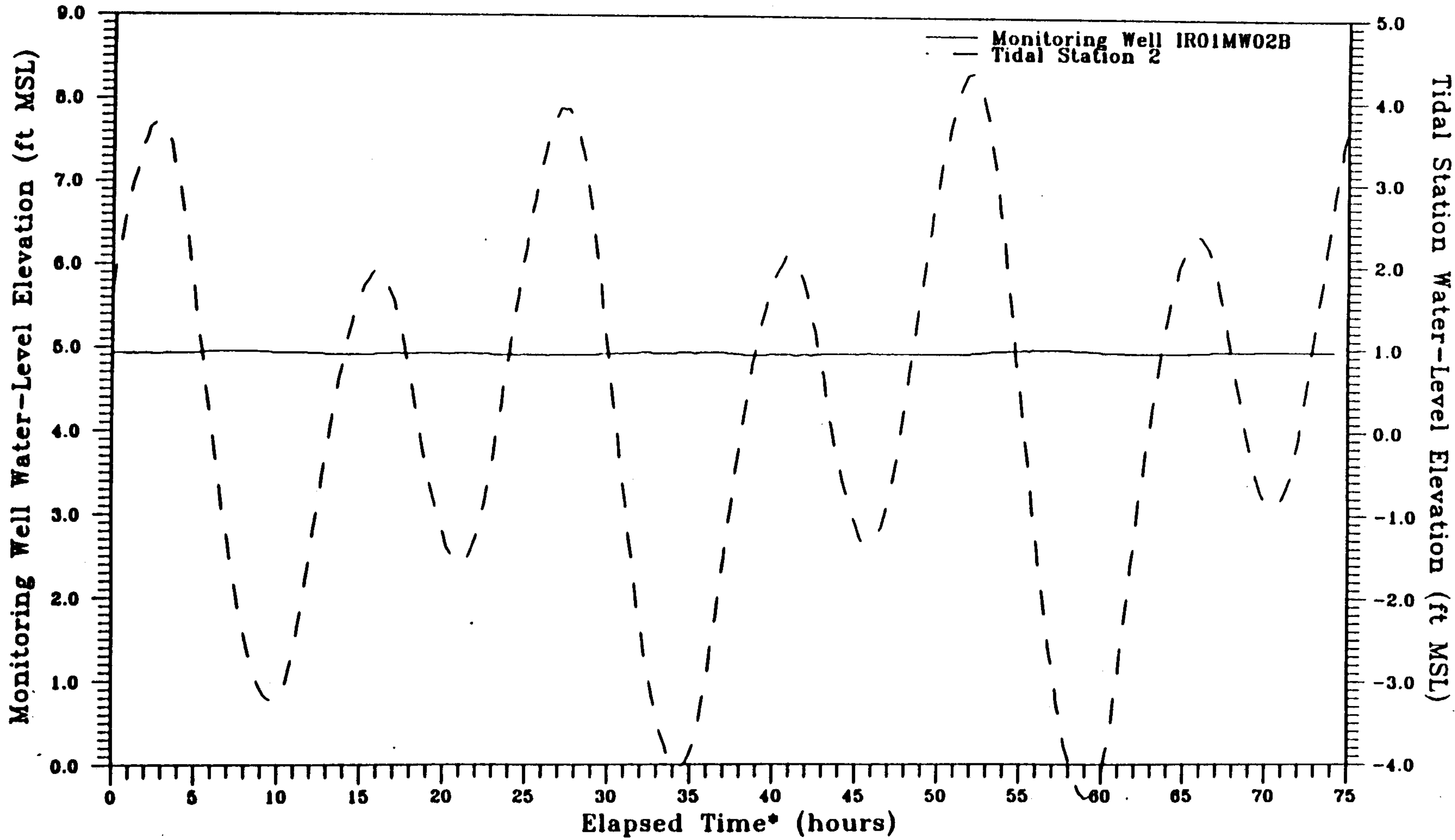
C1-A

HYDROGRAPHS FOR
FIRST ROUND OF TIDAL INFLUENCE MONITORING

WL CHANGE	0.10	A
TDS	1,200	
SALINITY	790	

HYDROGRAPH

Monitoring Well IR01MW02B in Area 2, and Tidal Station 2, First Quarter

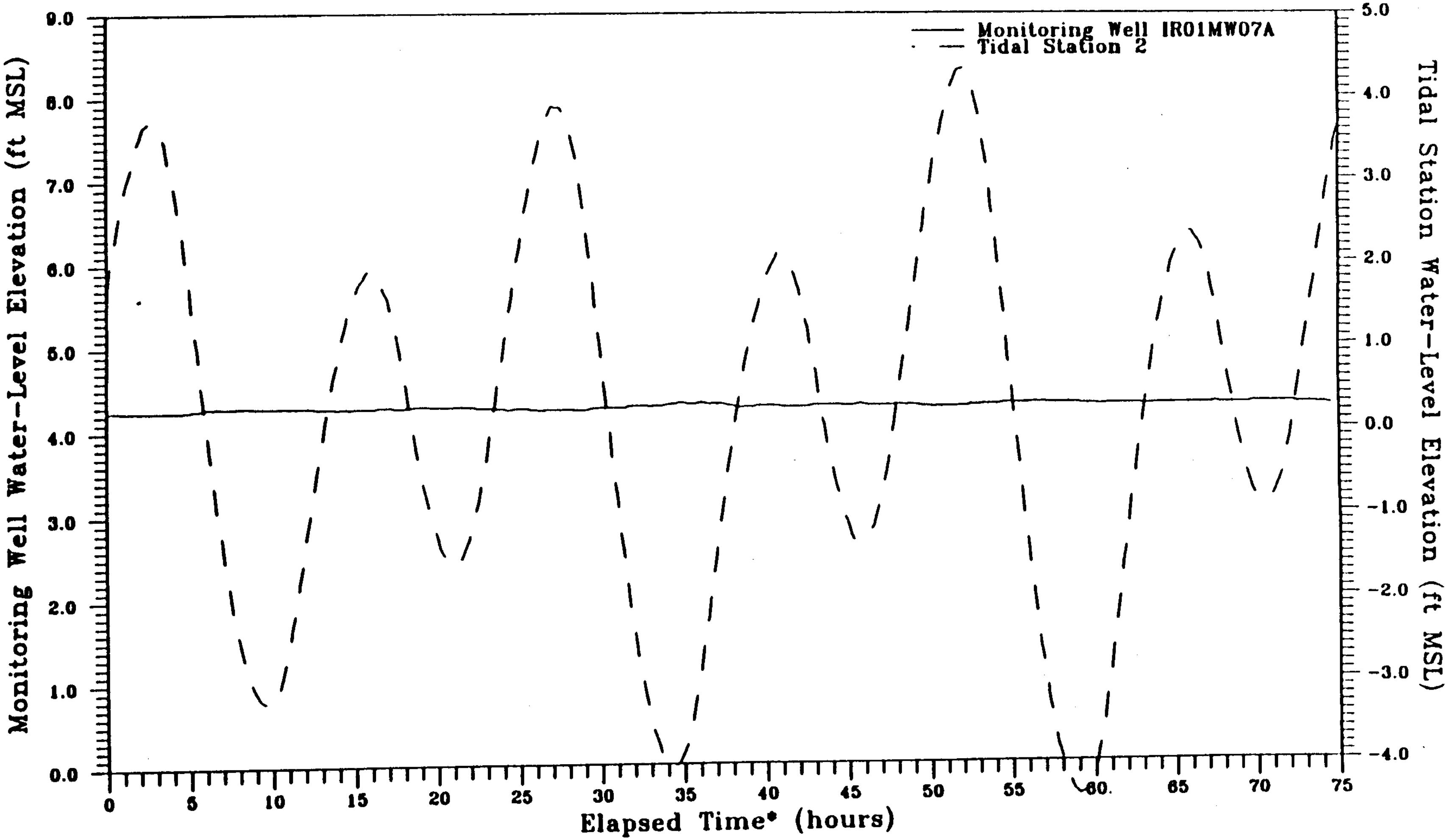


* Monitoring Period began at 06:00am on 11/18/91

WL CHANGE	0.60	A
TDS	1,600	
SALINITY	980	

HYDROGRAPH

Monitoring Well IR01MW07A in Area 2, and Tidal Station 2, First Quarter

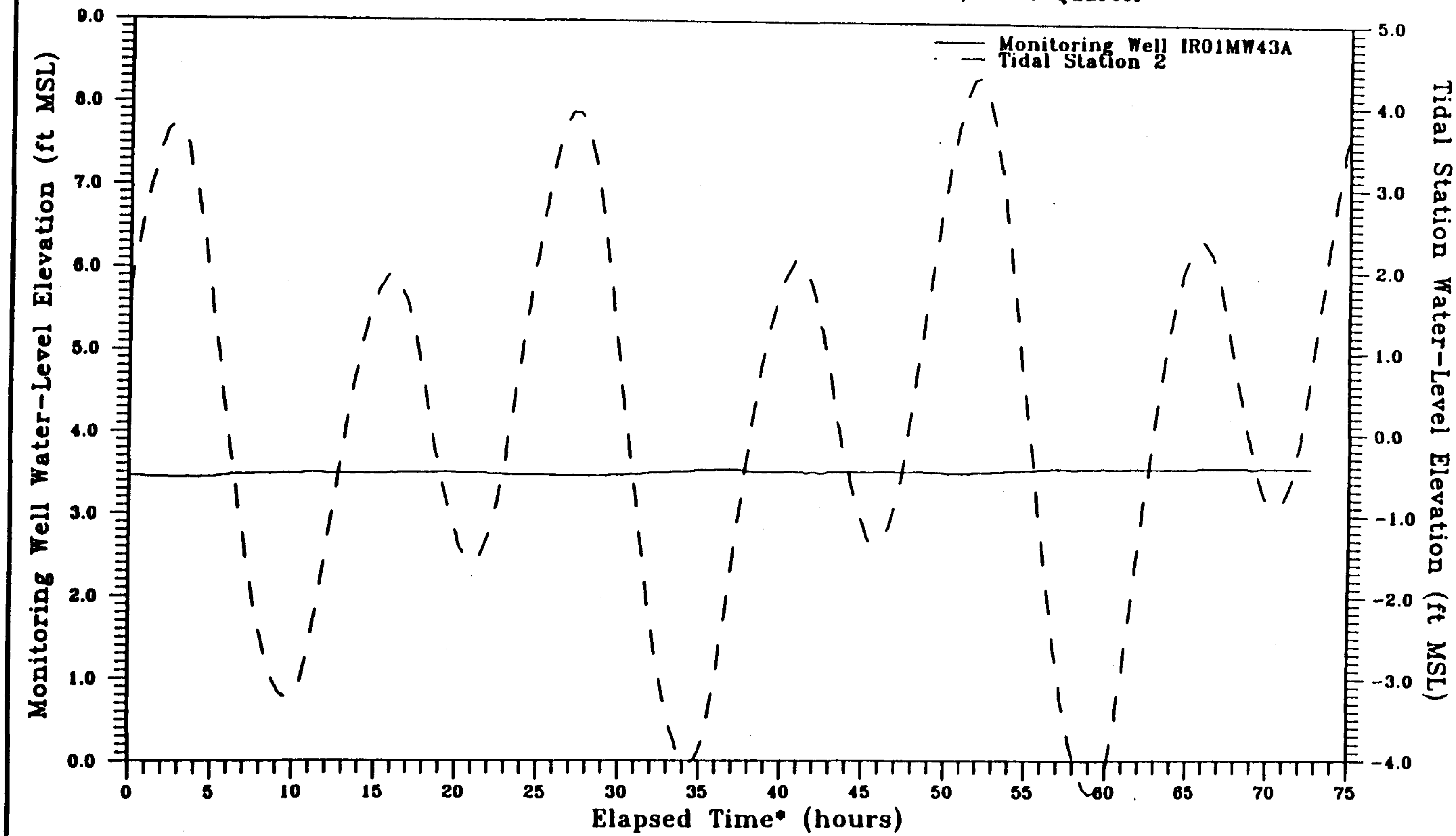


* Monitoring Period began at 06:00am on 11/18/91

WL CHANGE	0.12	A
TDS	8,200	
SALINITY	7,000	

HYDROGRAPH

Monitoring Well IR01MW43A in Area 2, and Tidal Station 2, First Quarter

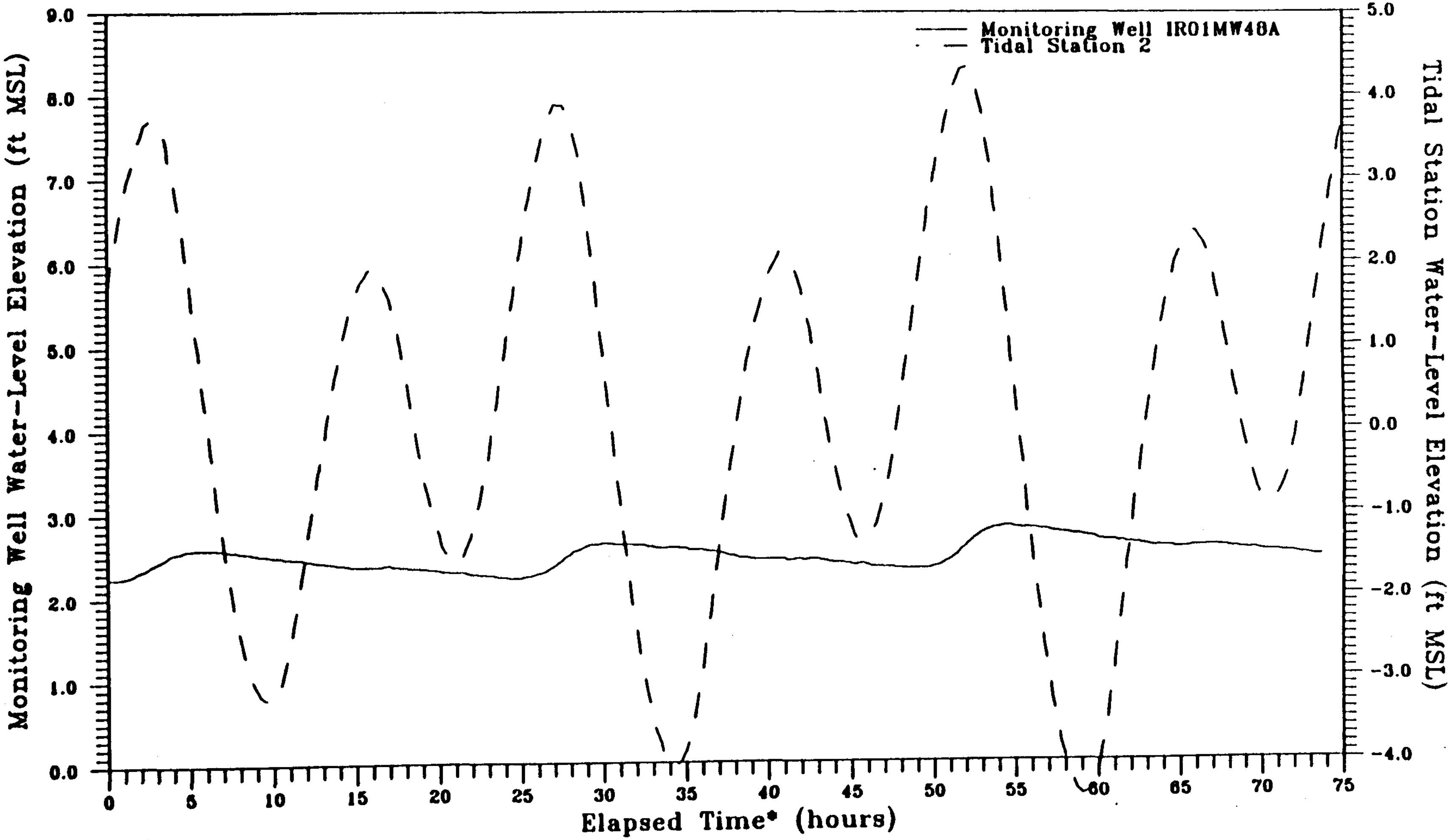


* Monitoring Period began at 06:00am on 11/18/91

WL CHANGE	0.51	A
TDS	5,500	
SALINITY	5,200	

HYDROGRAPH

Monitoring Well IR01MW48A in Area 2, and Tidal Station 2, First Quarter

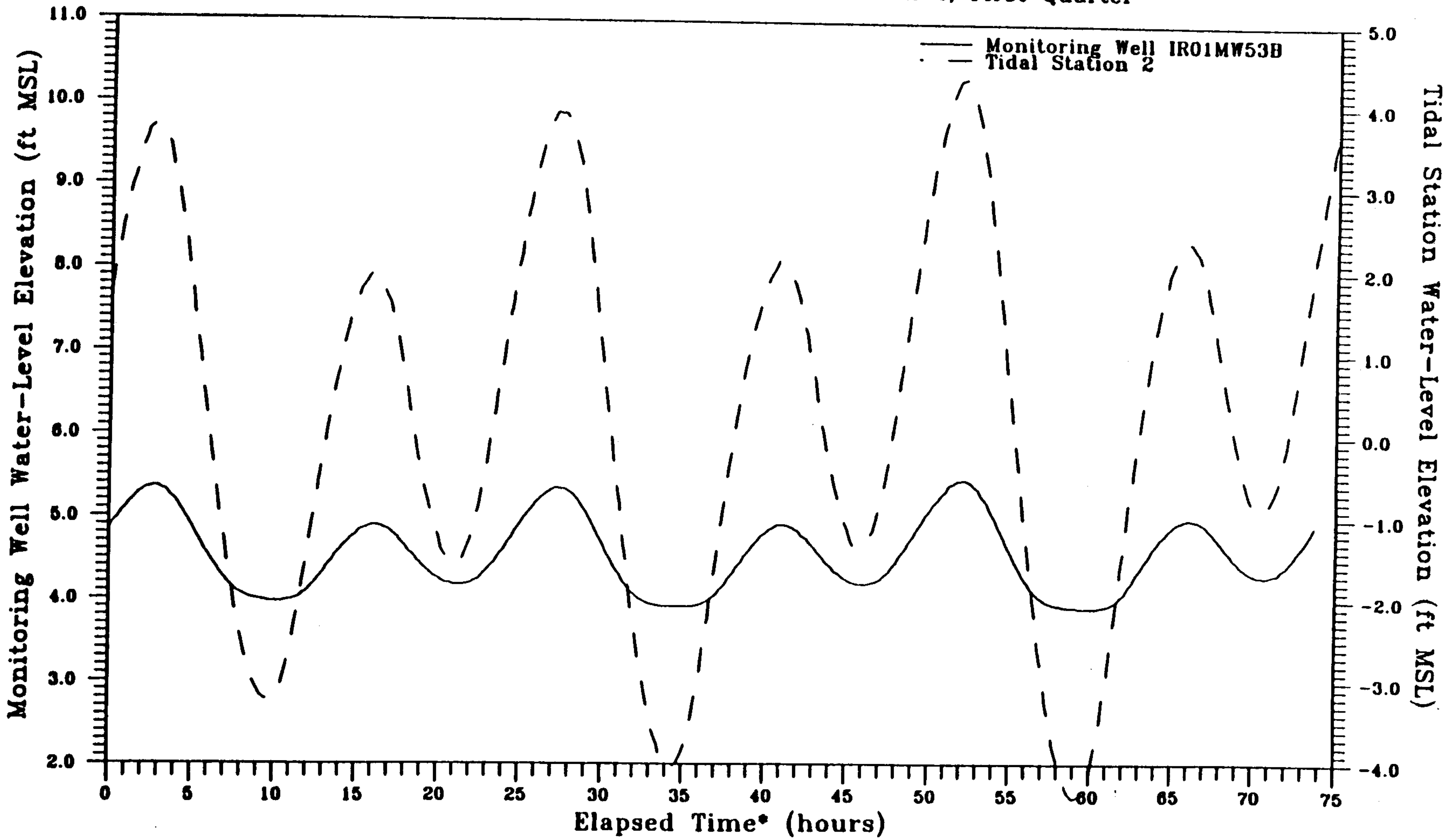


* Monitoring Period began at 06:00am on 11/18/91

WL CHANGE	1.61	A
TDS	2,700	
SALINITY	-	NA

HYDROGRAPH

Monitoring Well IR01MW53B in Area 2, and Tidal Station 2, First Quarter

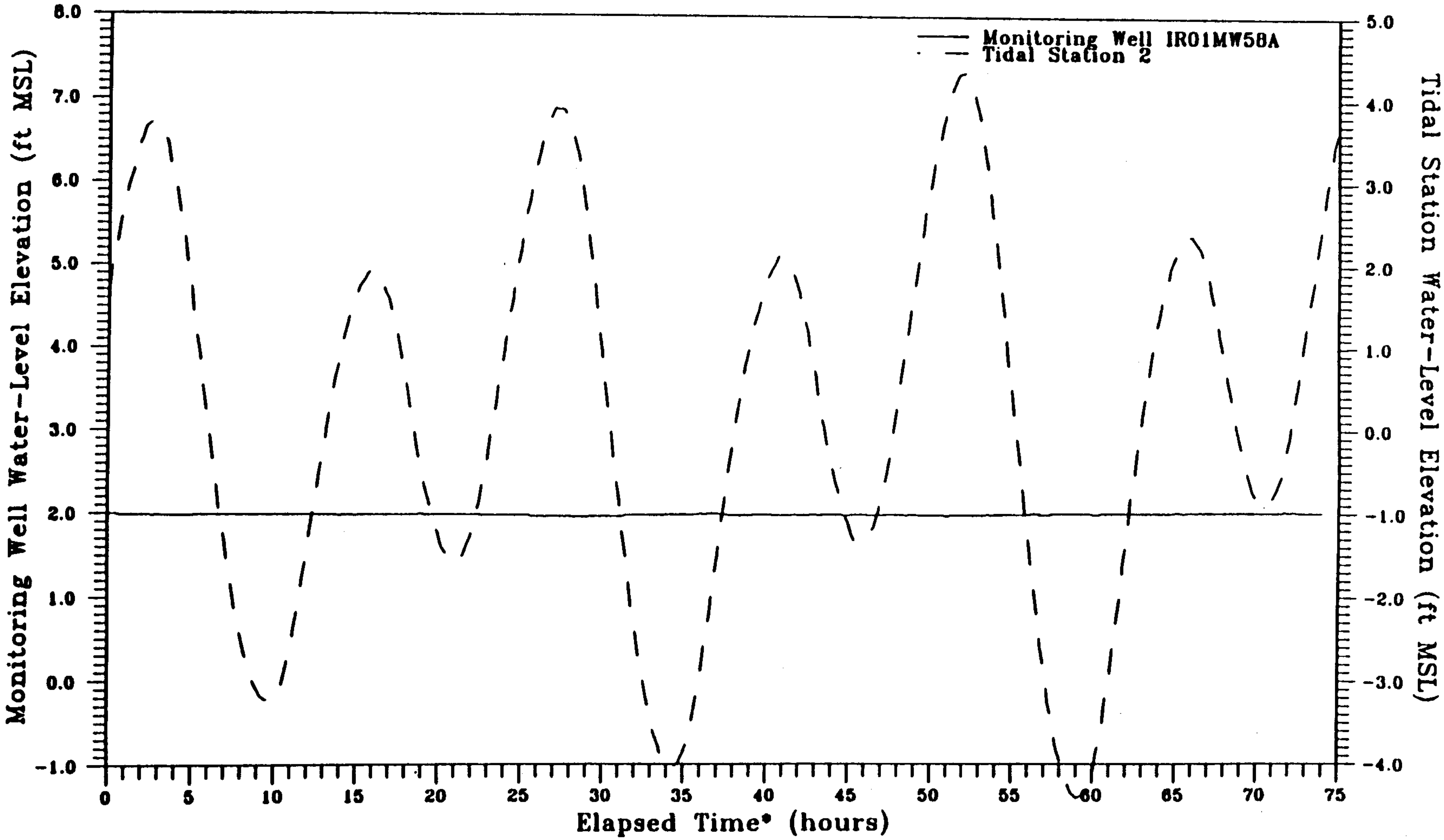


* Monitoring Period began at 06:00am on 11/18/91

WL CHANGE	0.07	A
TDS	5,100	
SALINITY	4,800	

HYDROGRAPH

Monitoring Well IR01MW58A in Area 2, and Tidal Station 2, First Quarter

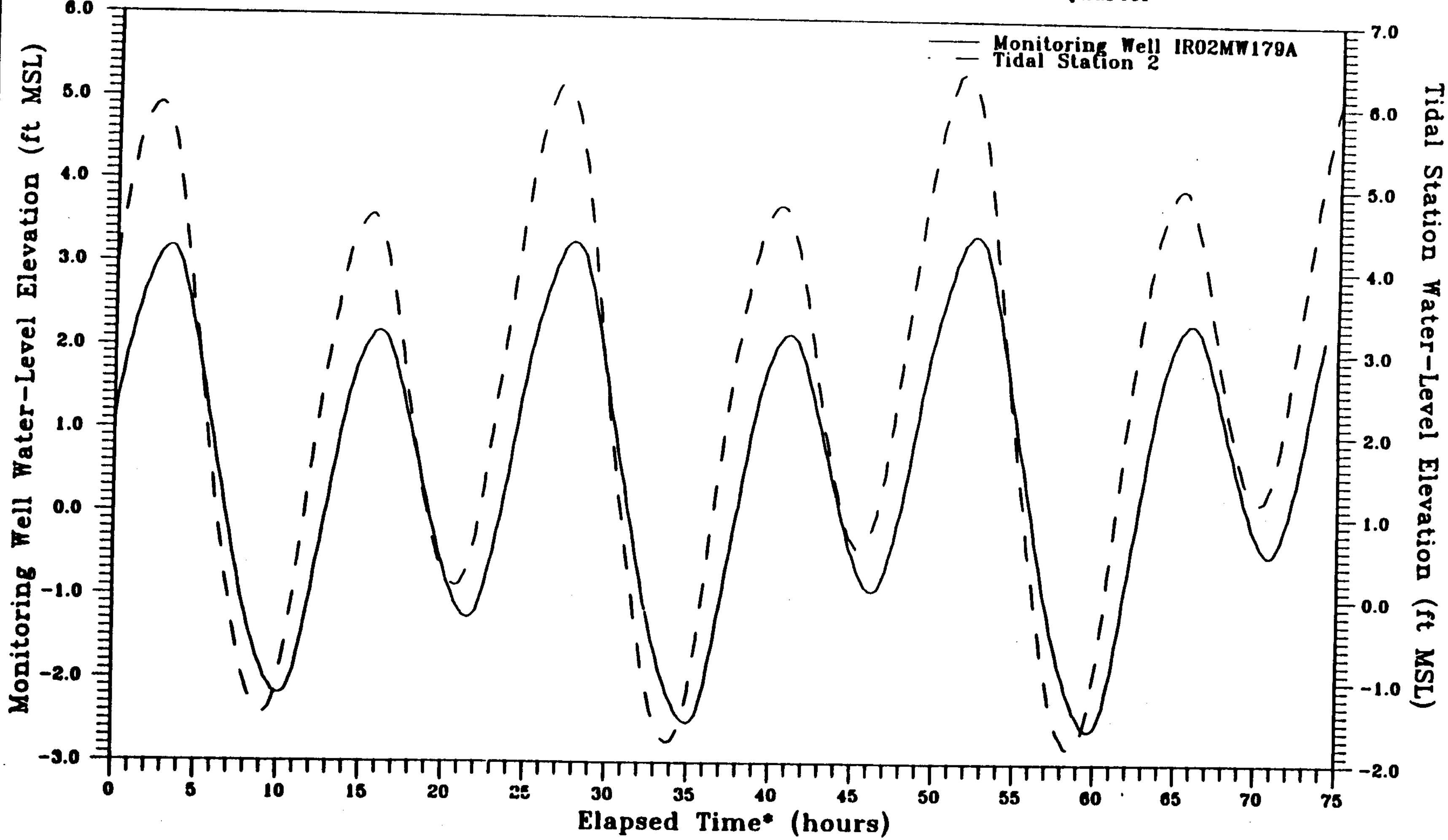


* Monitoring Period began at 06:00am on 11/18/91

WL CHANGE	5.70	A
TDS	32,000	
SALINITY	24,000	

HYDROGRAPH

Monitoring Well IR02MW179A in Area 4, and Tidal Station 2, First Quarter

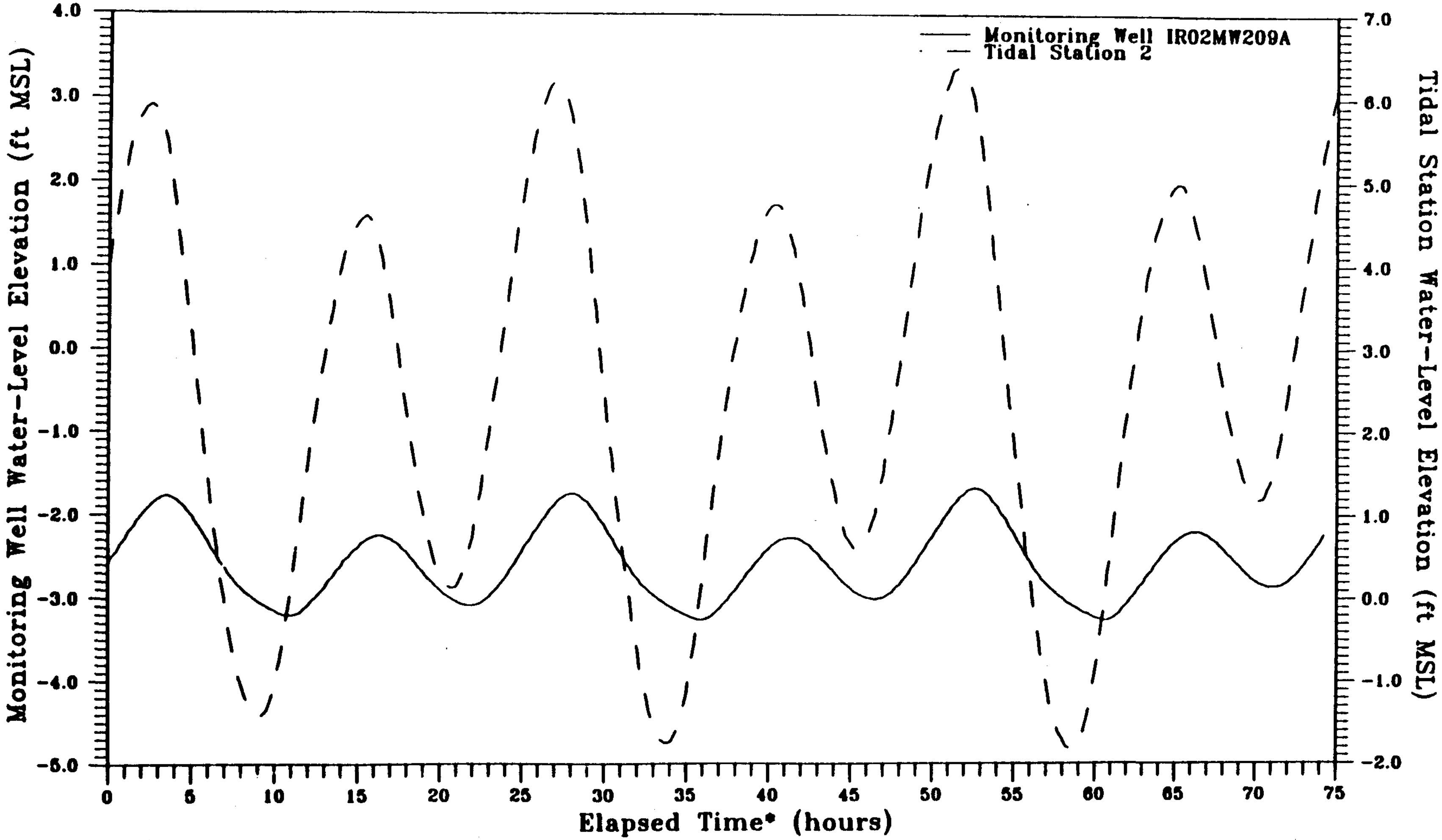


* Monitoring Period began at 07:00am on 11/03/91

WL CHANGE	1.58	Q1
TDS	34,000	
SALINITY	25,000	

HYDROGRAPH

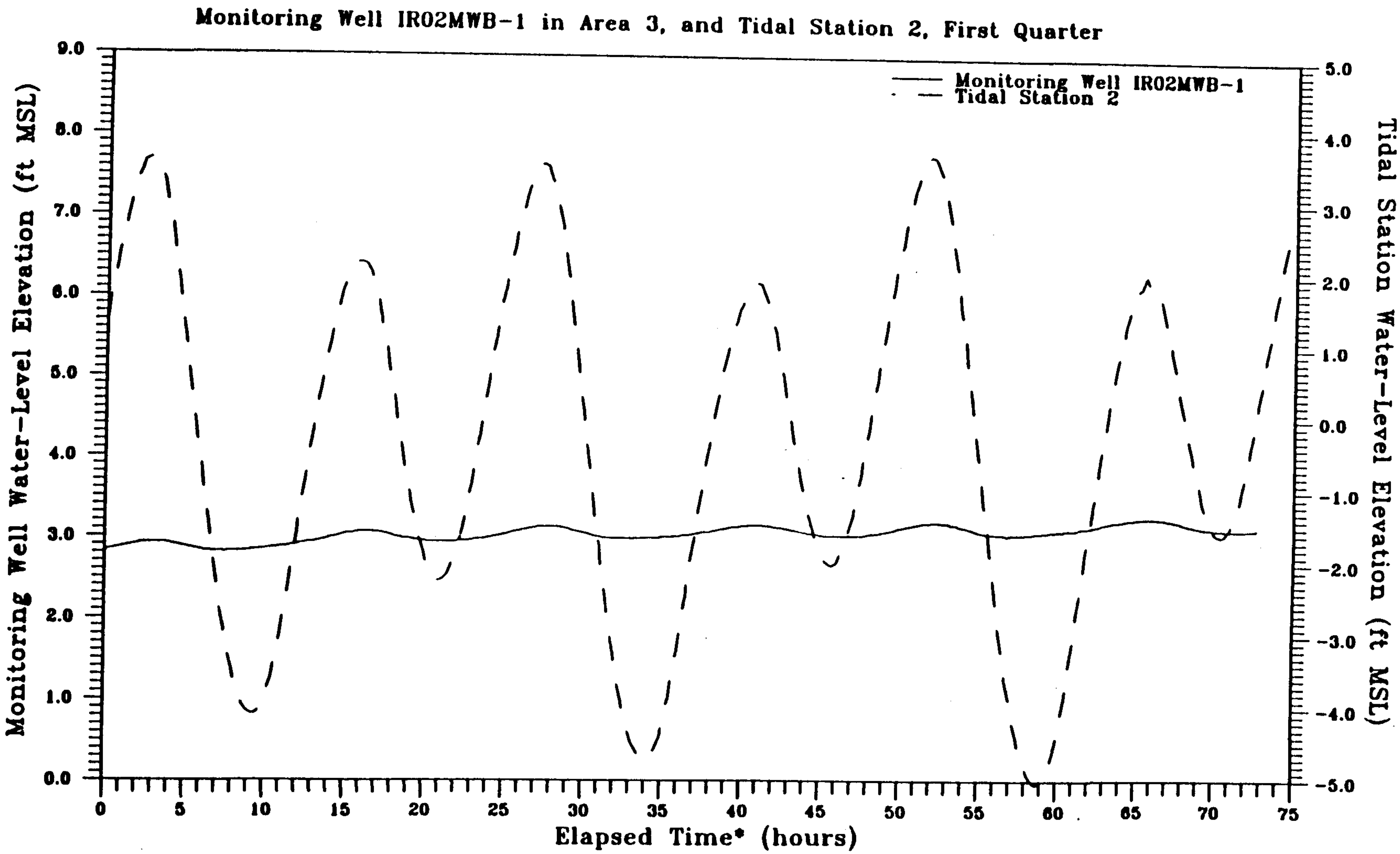
Monitoring Well IR02MW209A in Area 4, and Tidal Station 2, First Quarter



* Monitoring Period began at 07:00am on 11/03/91

WL CHANGE	0.51	A
TDS	19,000	
SALINITY	13,000	

HYDROGRAPH

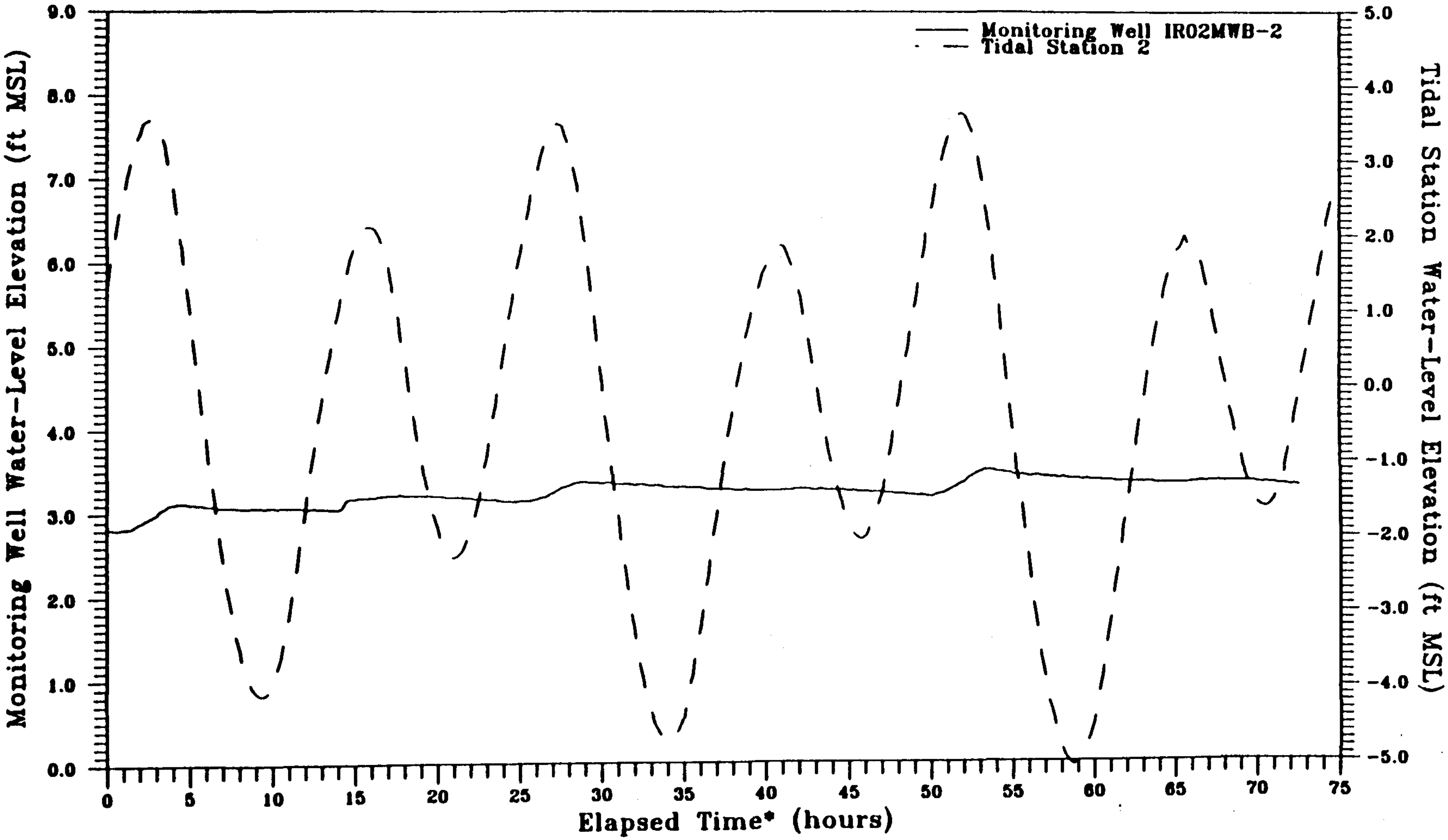


* Monitoring Period began at 9:00am on 10/22/91

WL CHANGE	0.68	A
TDS	20,000	
SALINITY	24,000	

HYDROGRAPH

Monitoring Well IR02MWB-2 in Area 3, and Tidal Station 2, First Quarter

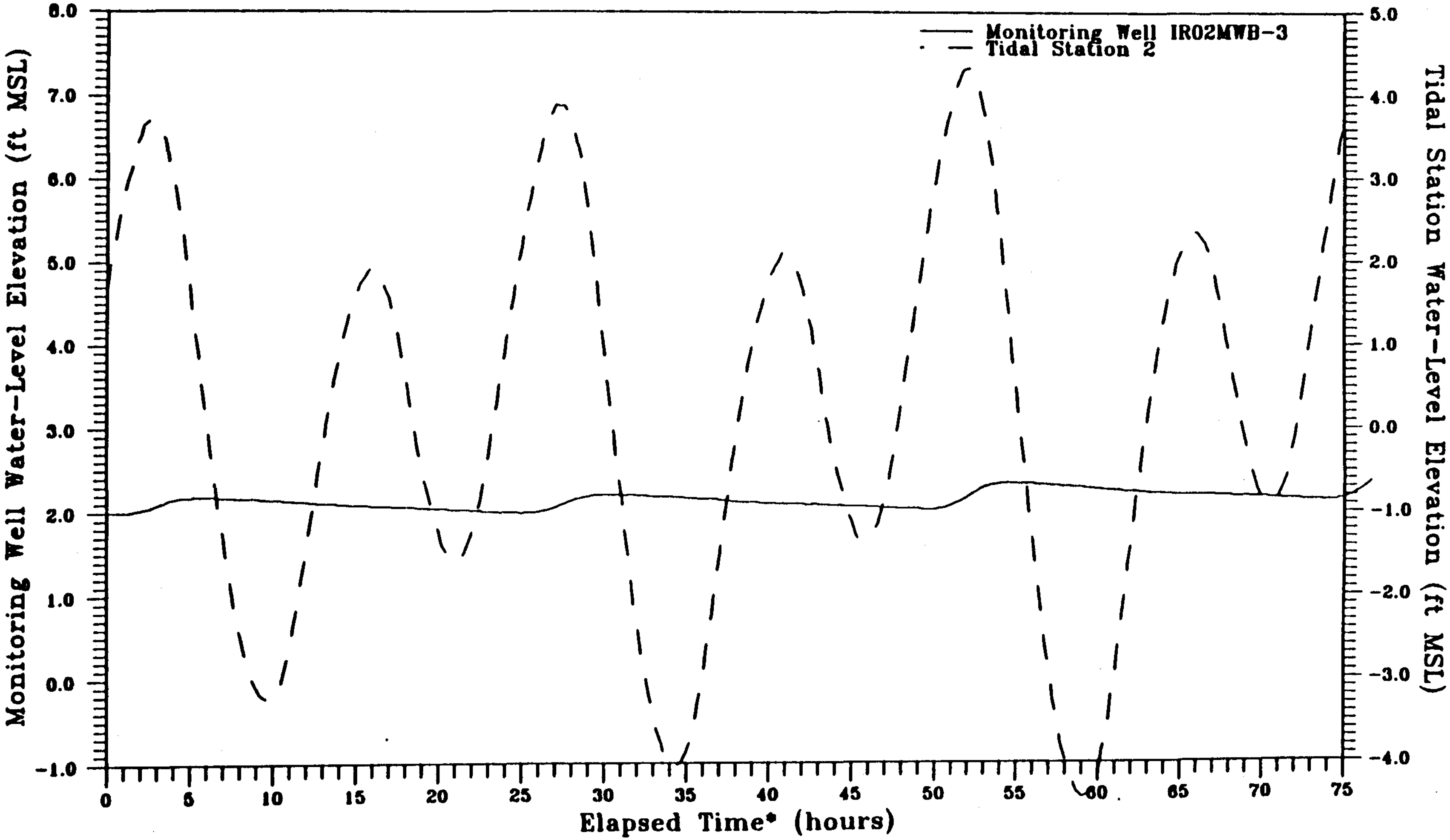


* Monitoring Period began at 9:00am on 10/22/91

WL CHANGE	0.37	A
TDS	14,000	
SALINITY	11,000	

HYDROGRAPH

Monitoring Well IR02MWB-3 in Area 2, and Tidal Station 2, First Quarter

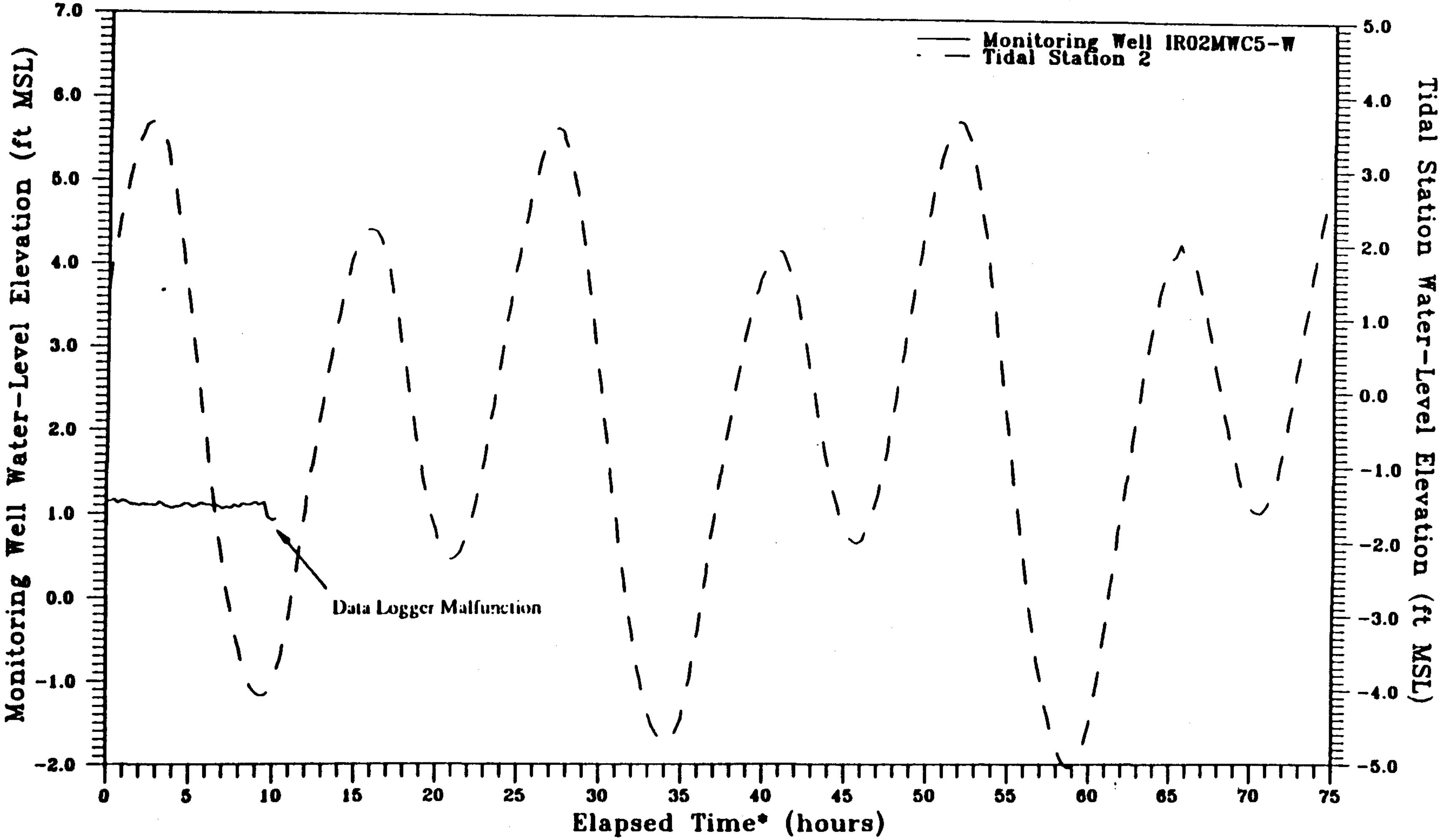


* Monitoring Period began at 06:00am on 11/18/91

WL CHANGE	0.26	Q2
TDS	9,400	
SALINITY	8,800	

HYDROGRAPH

Monitoring Well IR02MWC5-W in Area 3, and Tidal Station 2, First Quarter

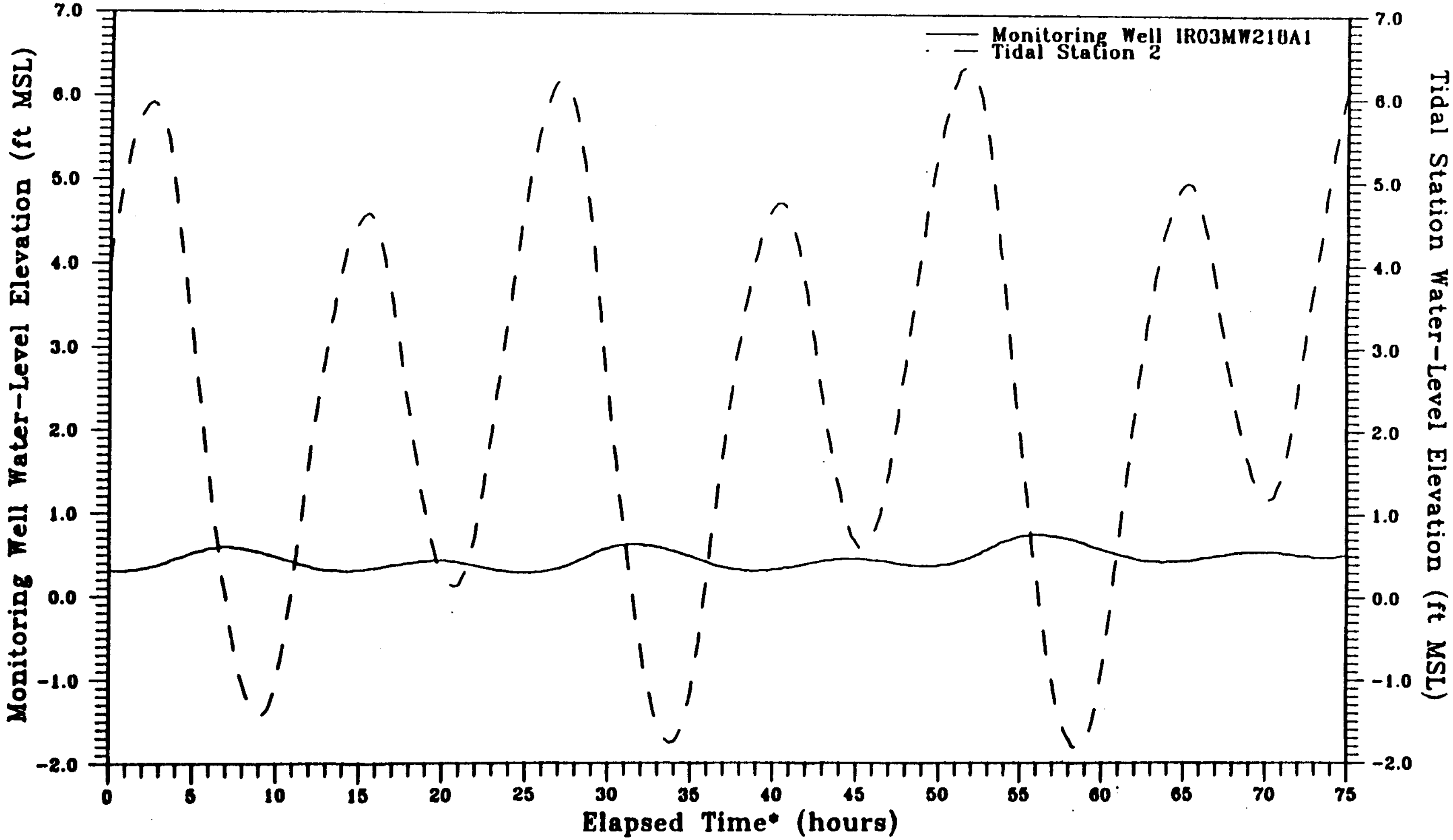


* Monitoring Period began at 9:00am on 10/22/91

WL CHANGE	0.44	A
TDS	17,000	
SALINITY	14,000	

HYDROGRAPH

Monitoring Well IR03MW218A1 in Area 4, and Tidal Station 2, First Quarter

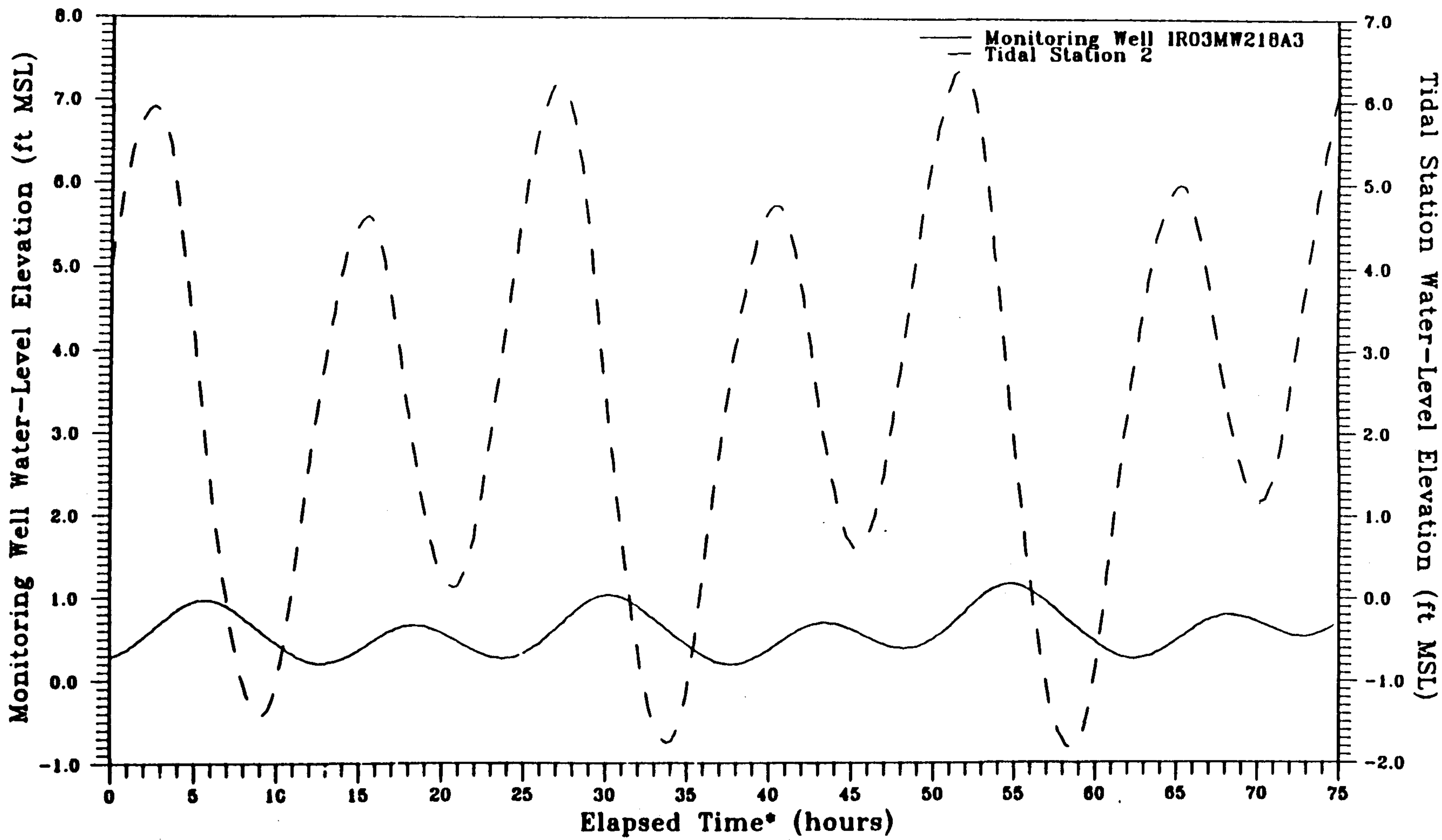


* Monitoring Period began at 07:00am on 11/03/91

WL CHANGE	1.04	A
TDS	23,000	
SALINITY	NA	

HYDROGRAPH

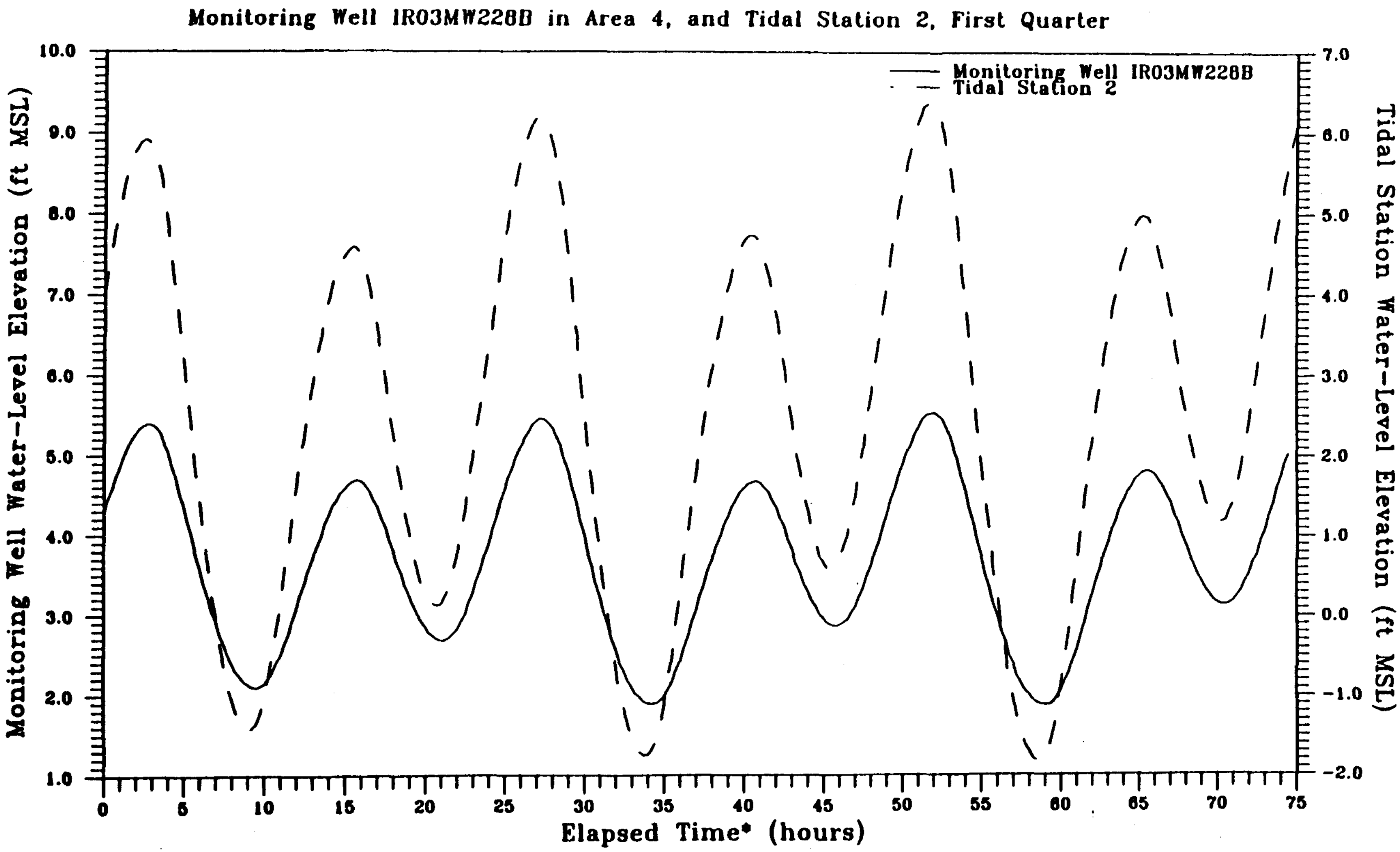
Monitoring Well IR03MW218A3 in Area 4, and Tidal Station 2, First Quarter



* Monitoring Period began at 07:00am on 11/03/91

WL CHANGE	3.66	A
TDS	680	
SALINITY	460	

HYDROGRAPH

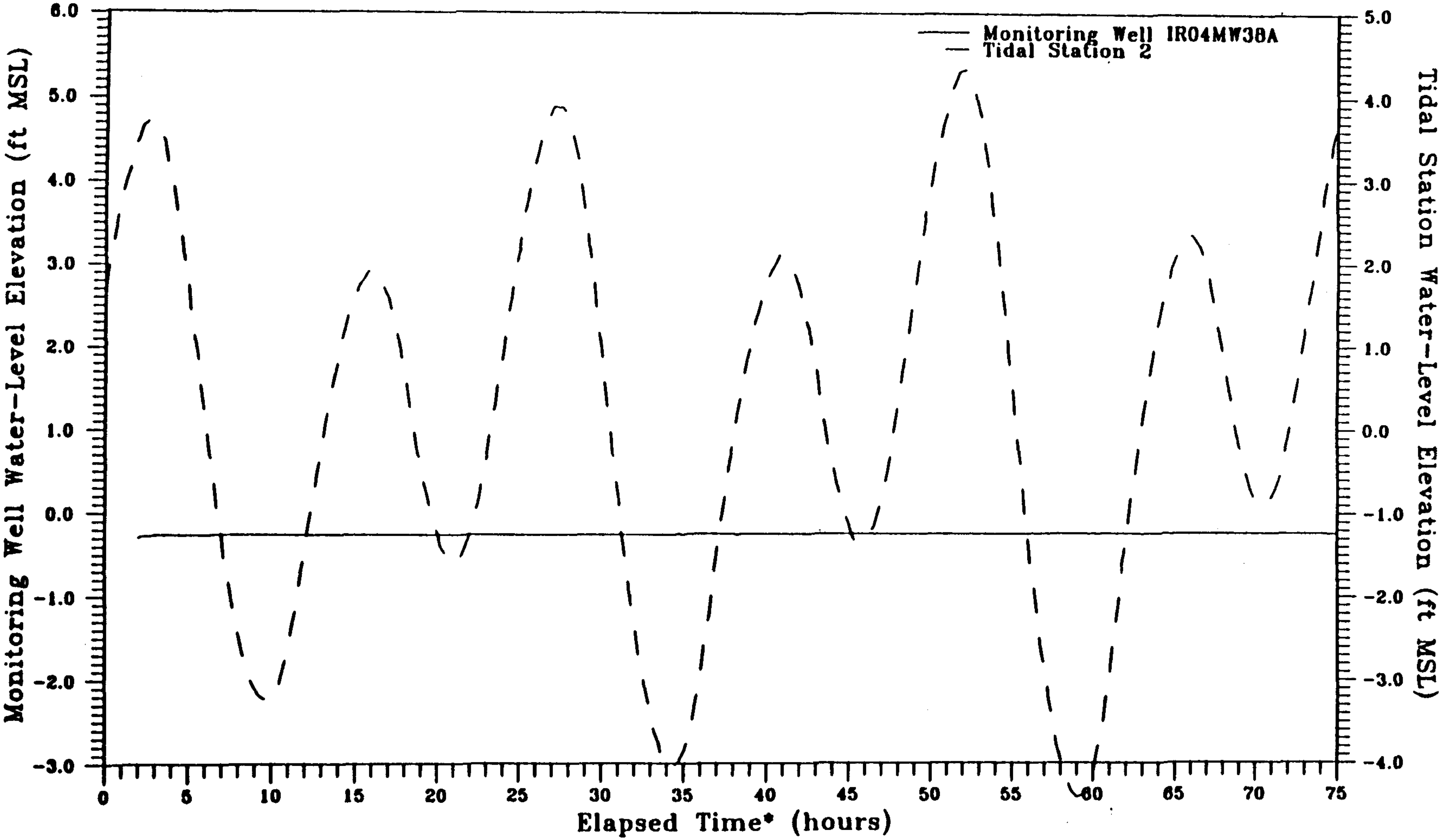


* Monitoring Period began at 07:00am on 11/03/91

WL CHANGE	0.04	A
TDS	1,200	
SALINITY	860	

HYDROGRAPH

Monitoring Well IR04MW38A in Area 2, and Tidal Station 2, First Quarter

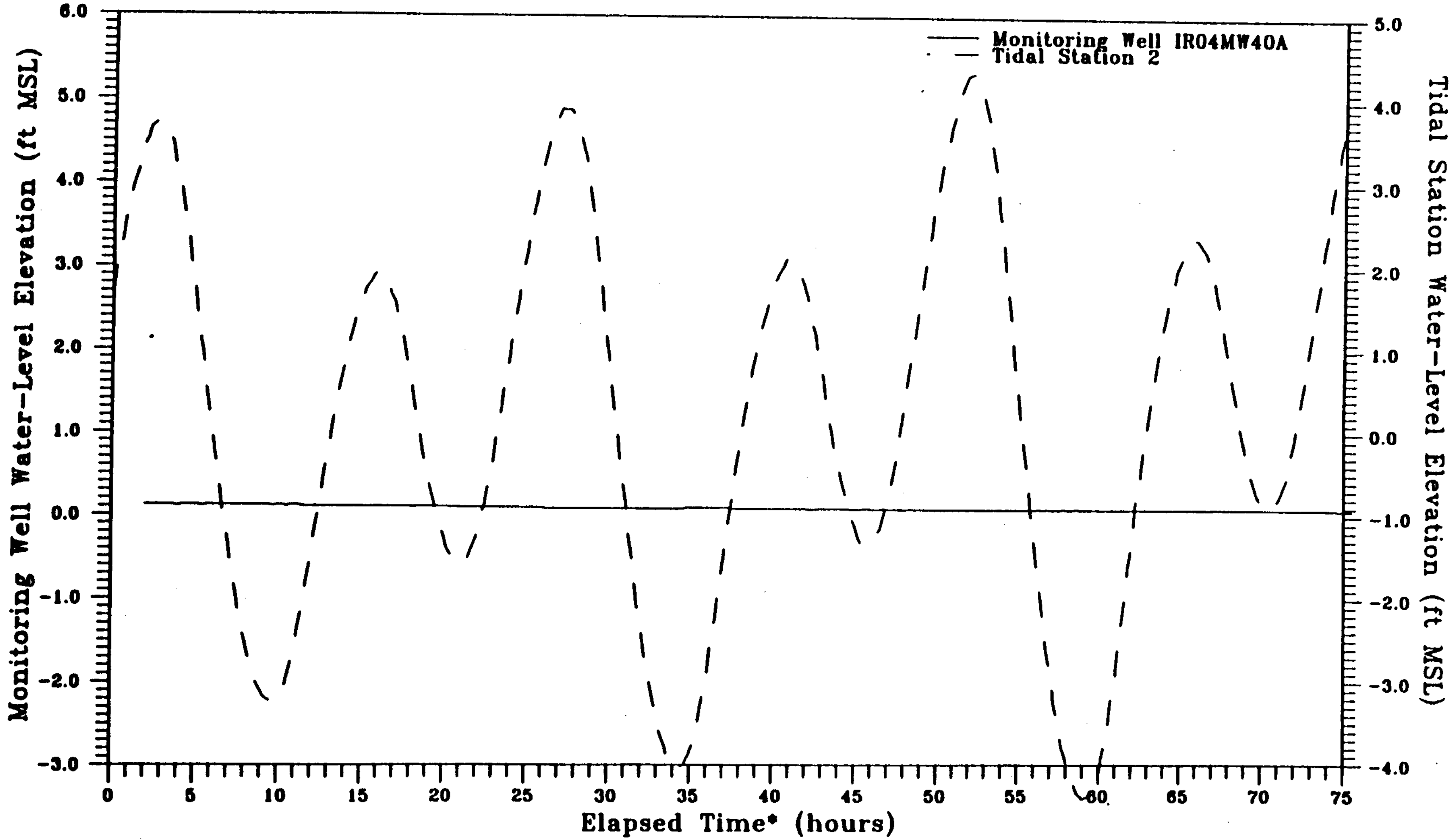


* Monitoring Period began at 08:00am on 11/18/91

WL CHANGE	1.31	A
TDS	17,000	
SALINITY	15,000	

HYDROGRAPH

Monitoring Well IR04MW40A in Area 2, and Tidal Station 2, First Quarter

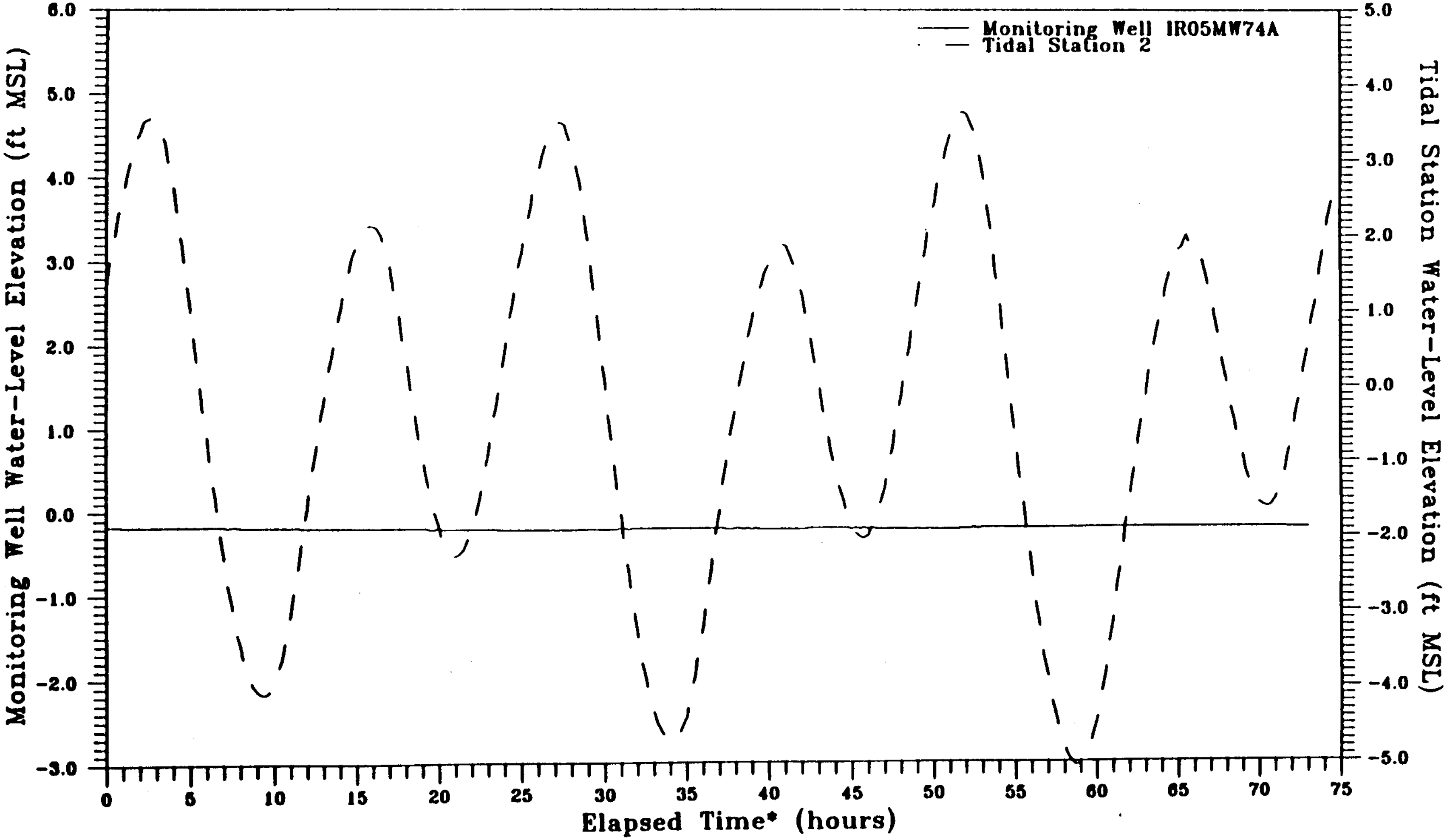


* Monitoring Period began at 08:00am on 11/18/91

WL CHANGE	0.14	A
TDS	9,000	
SALINITY	7,800	

HYDROGRAPH

Monitoring Well IR05MW74A in Area 3, and Tidal Station 2, First Quarter

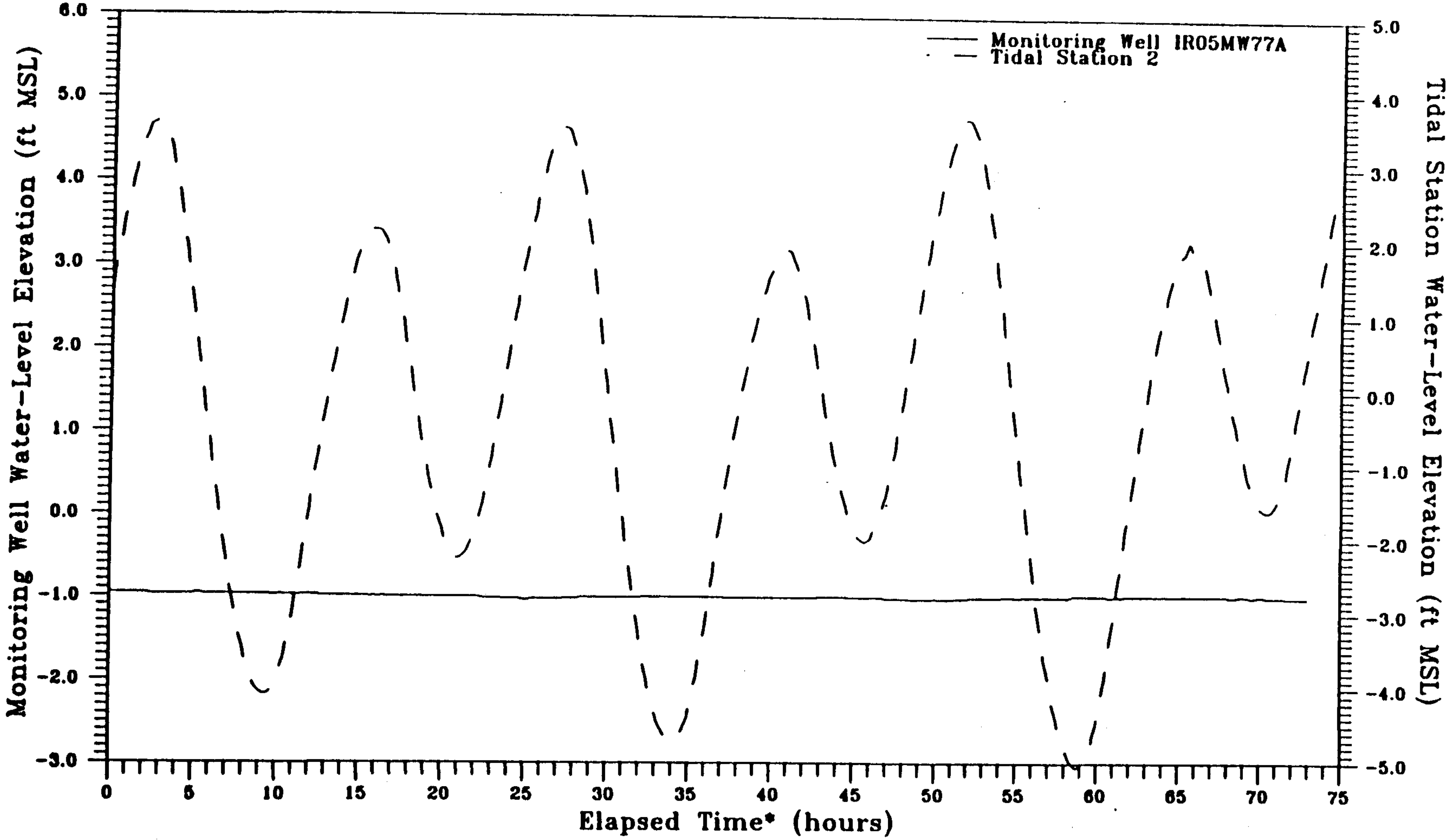


* Monitoring Period began at 9:00am on 10/22/91

WL CHANGE	0.21	A
TDS	5,700	
SALINITY	4,100	

HYDROGRAPH

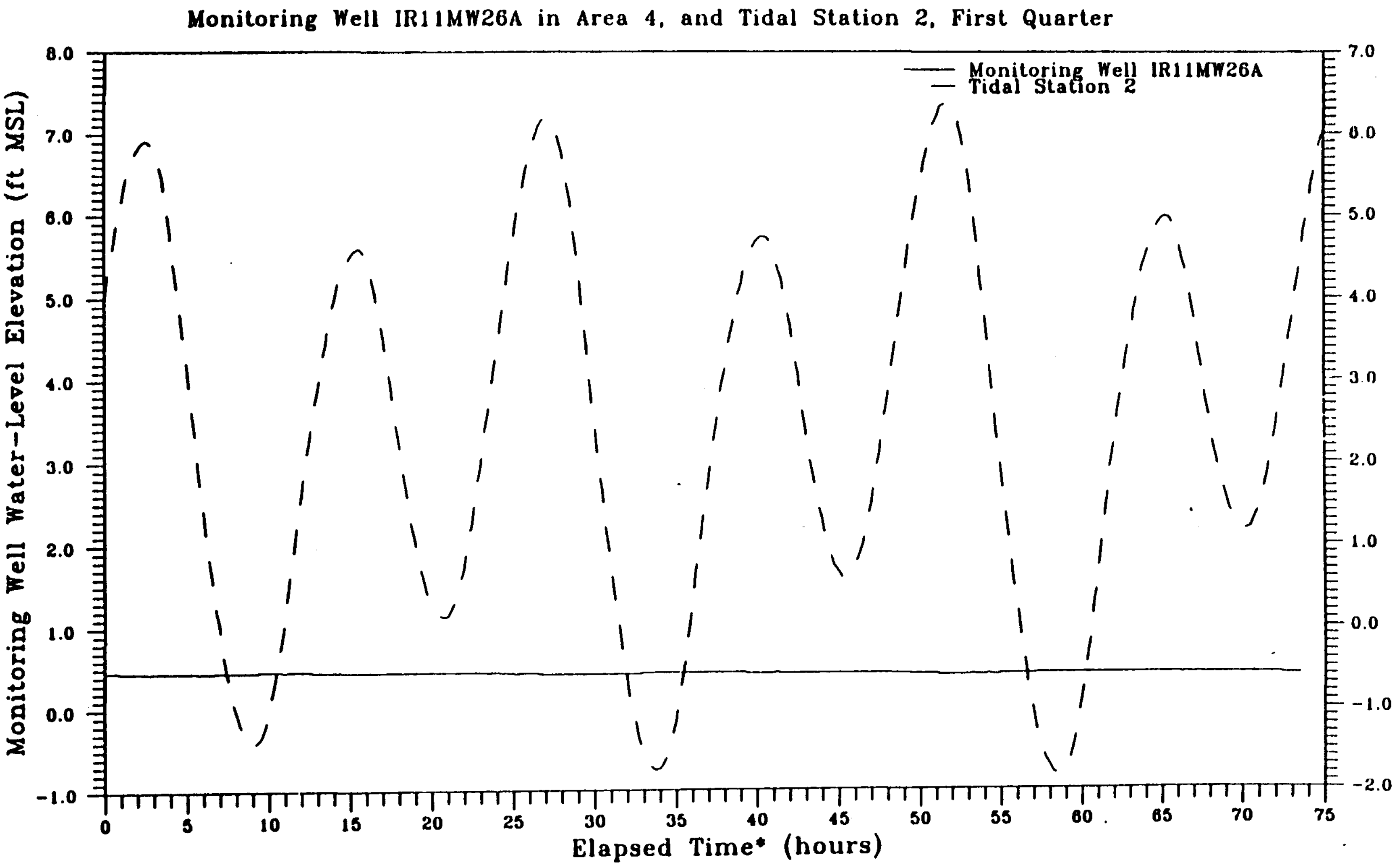
Monitoring Well IR05MW77A in Area 3, and Tidal Station 2, First Quarter



* Monitoring Period began at 9:00am on 10/22/91

WL CHANGE	0.09	A
TDS	4,400	
SALINITY	3,200	

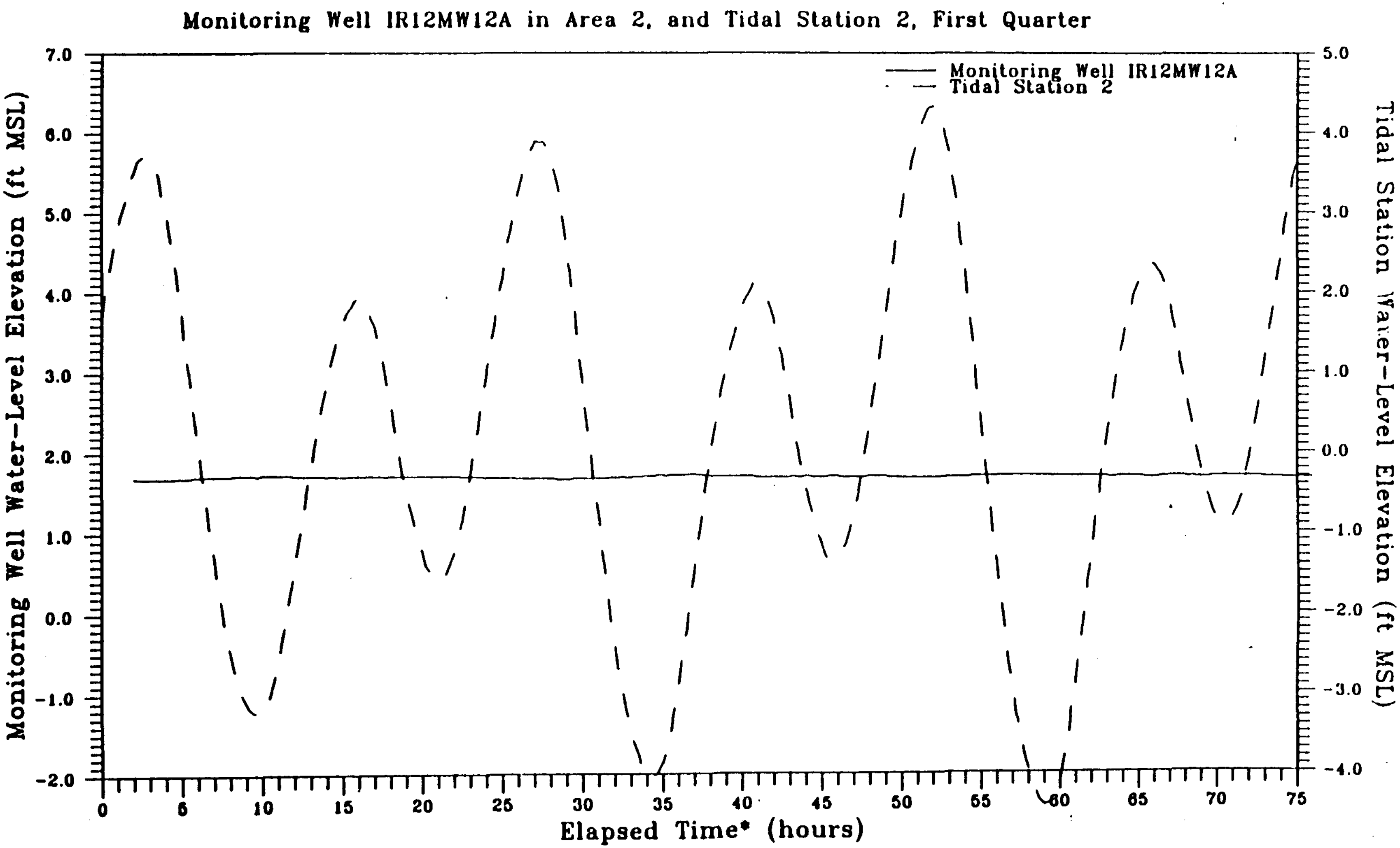
HYDROGRAPH



* Monitoring Period began at 07:00am on 11/03/91

WL CHANGE	0.10	A
TDS	600	
SALINITY	400	

HYDROGRAPH

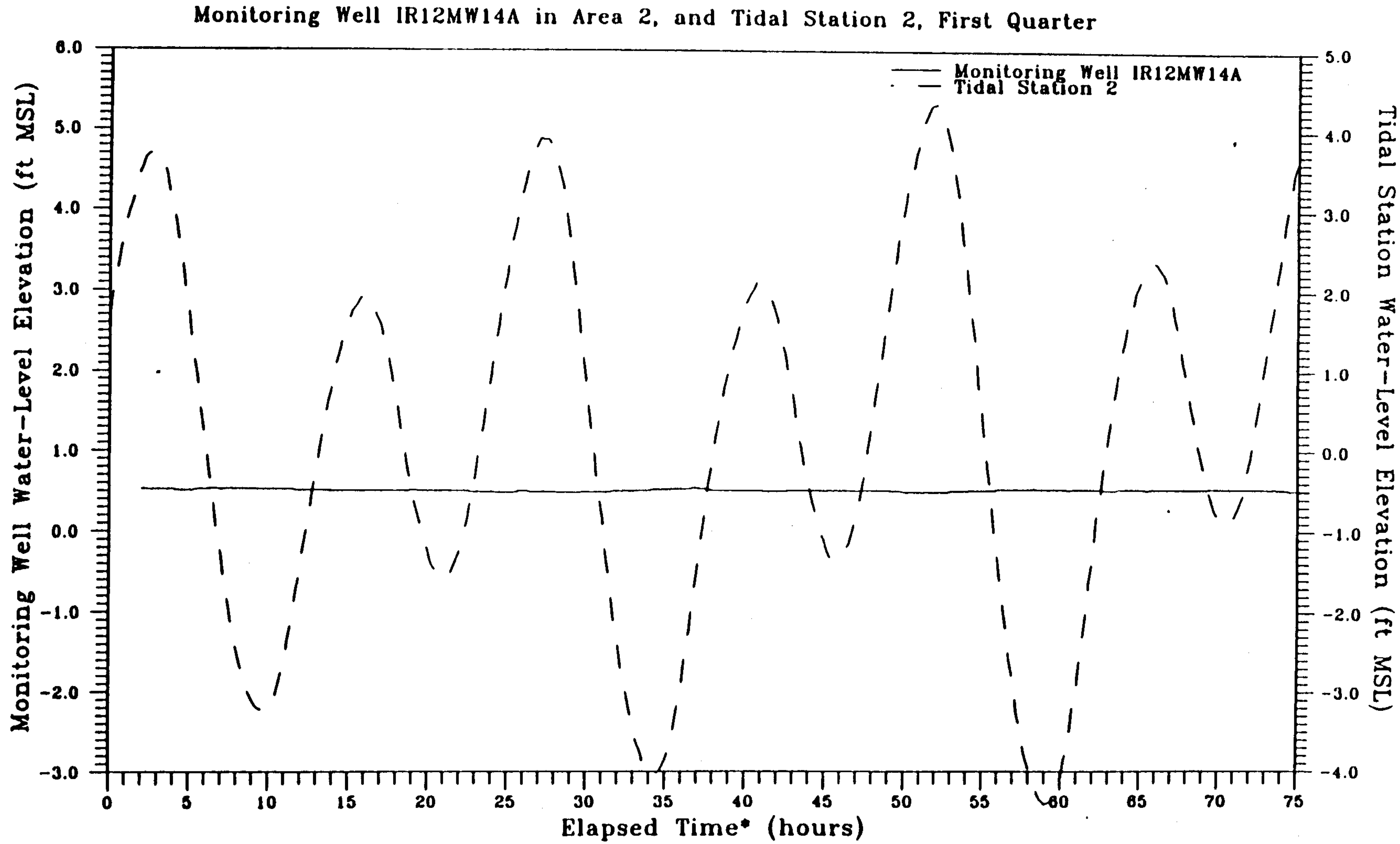


* Monitoring Period began at 08:00am on 11/18/91

DIETERICH-POST 130713

WL CHANGE	0.28	A
TDS	1,200	
SALINITY	770	

HYDROGRAPH

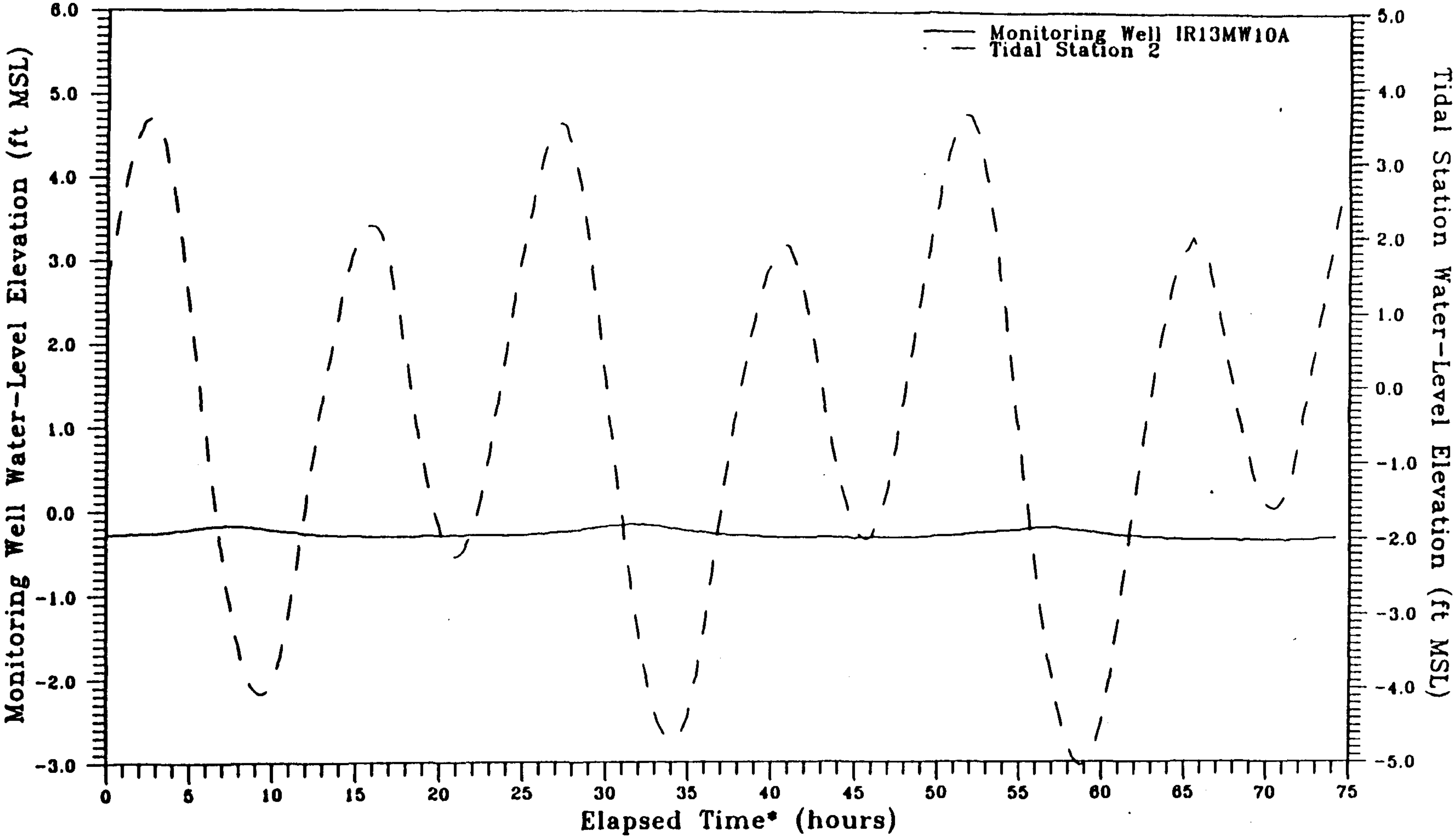


* Monitoring Period began at 08:00am on 11/18/91

WL CHANGE	0.31	A
TDS	21,000	
SALINITY	17,000	

HYDROGRAPH

Monitoring Well IR13MW10A in Area 3, and Tidal Station 2, First Quarter



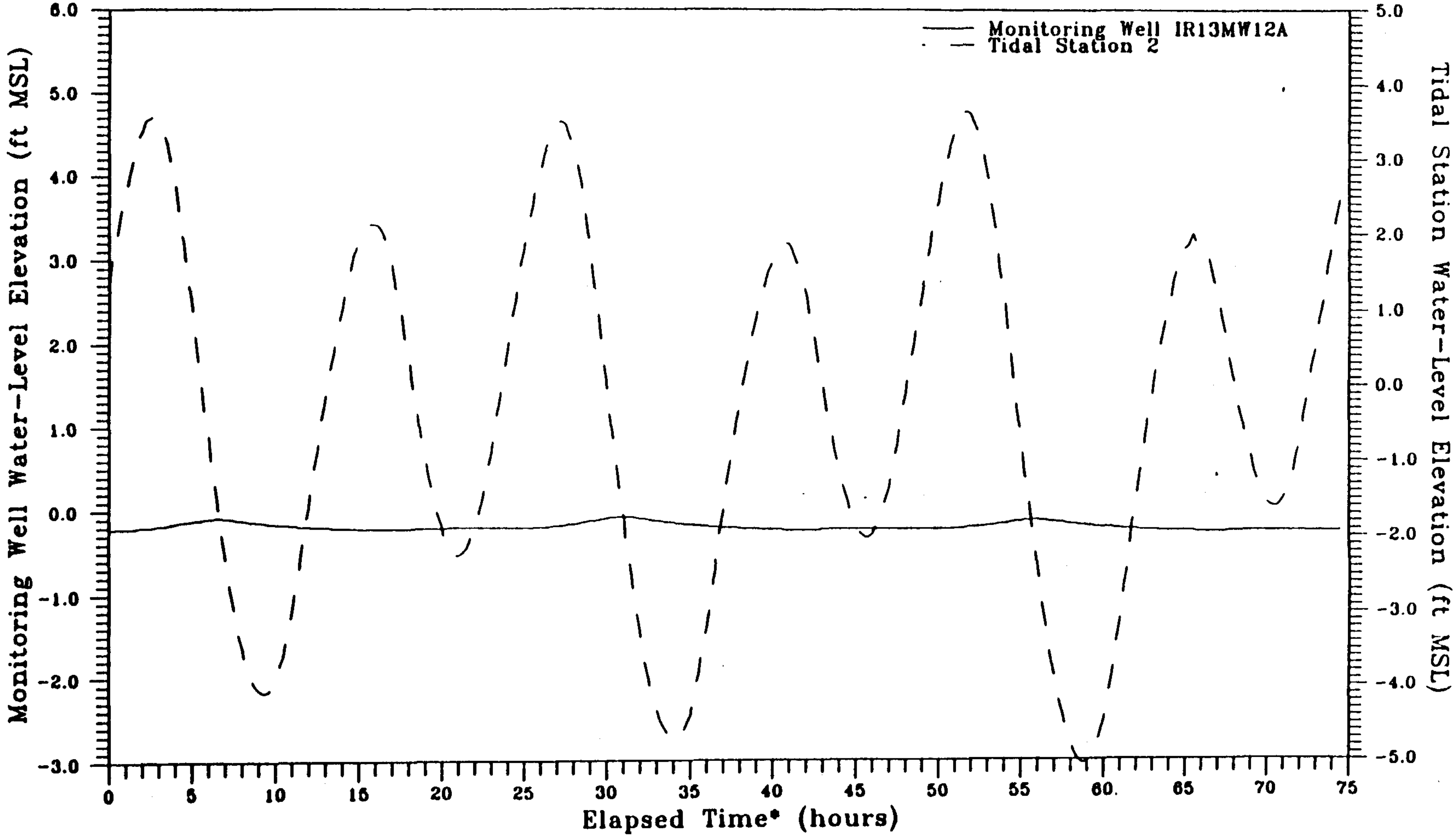
* Monitoring Period began at 9:00am on 10/22/91

DIETERCH-POST 130713

WL CHANGE	0.39	A
TDS	26,000	
SALINITY	20,000	

HYDROGRAPH

Monitoring Well IR13MW12A in Area 3, and Tidal Station 2, First Quarter

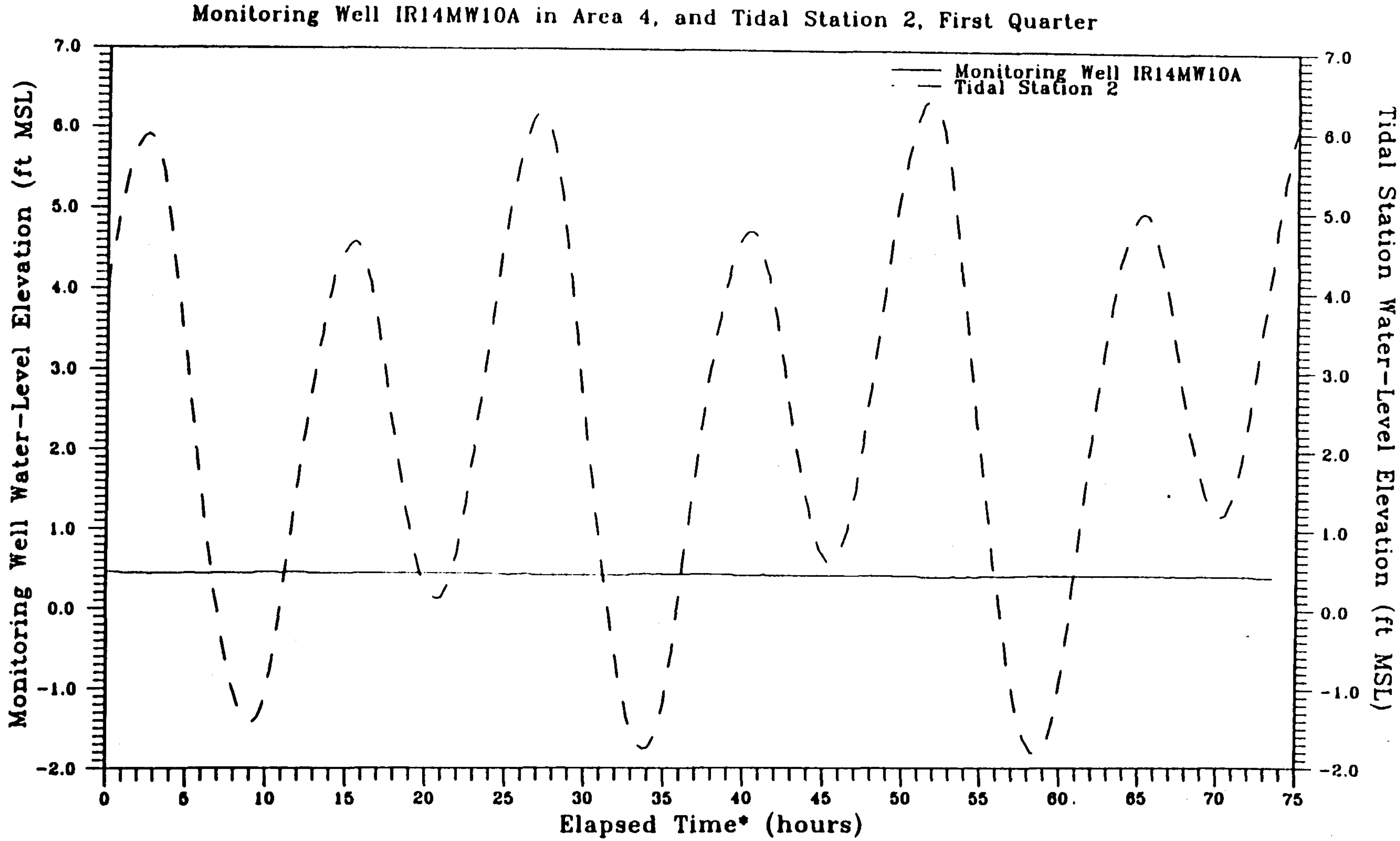


* Monitoring Period began at 9:00am on 10/22/91

DIETERICH-POST 130713

WL CHANGE	0.21	A
TDS	14,000	
SALINITY	11,000	

HYDROGRAPH



* Monitoring Period began at 07:00am on 11/03/91

DIETERICH-POST 130713

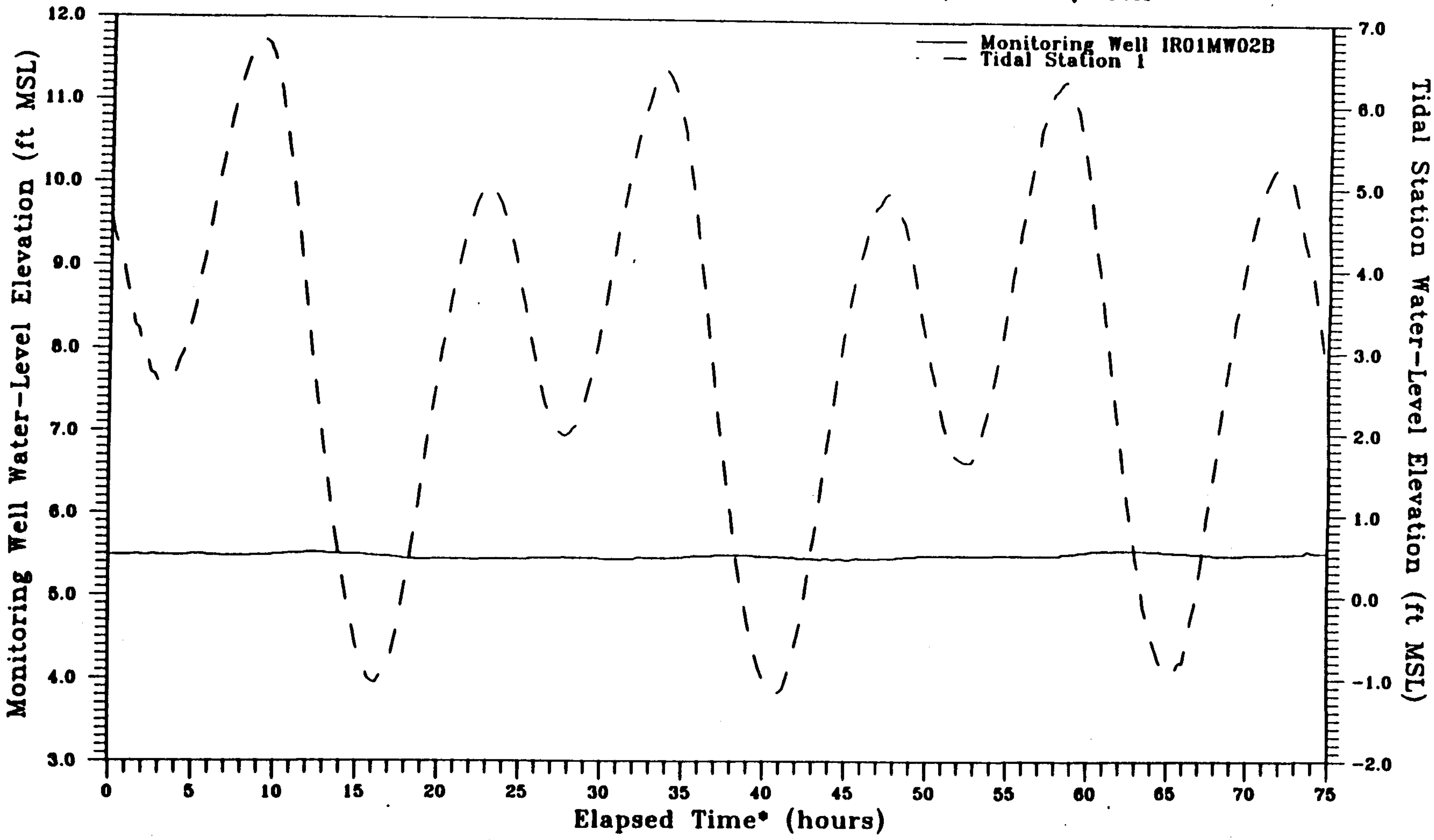
C1-B

HYDROGRAPHS FOR SECOND ROUND OF TIDAL INFLUENCE MONITORING

WL CHANGE	0.10	A
TDS	1,200	
SALINITY	790	

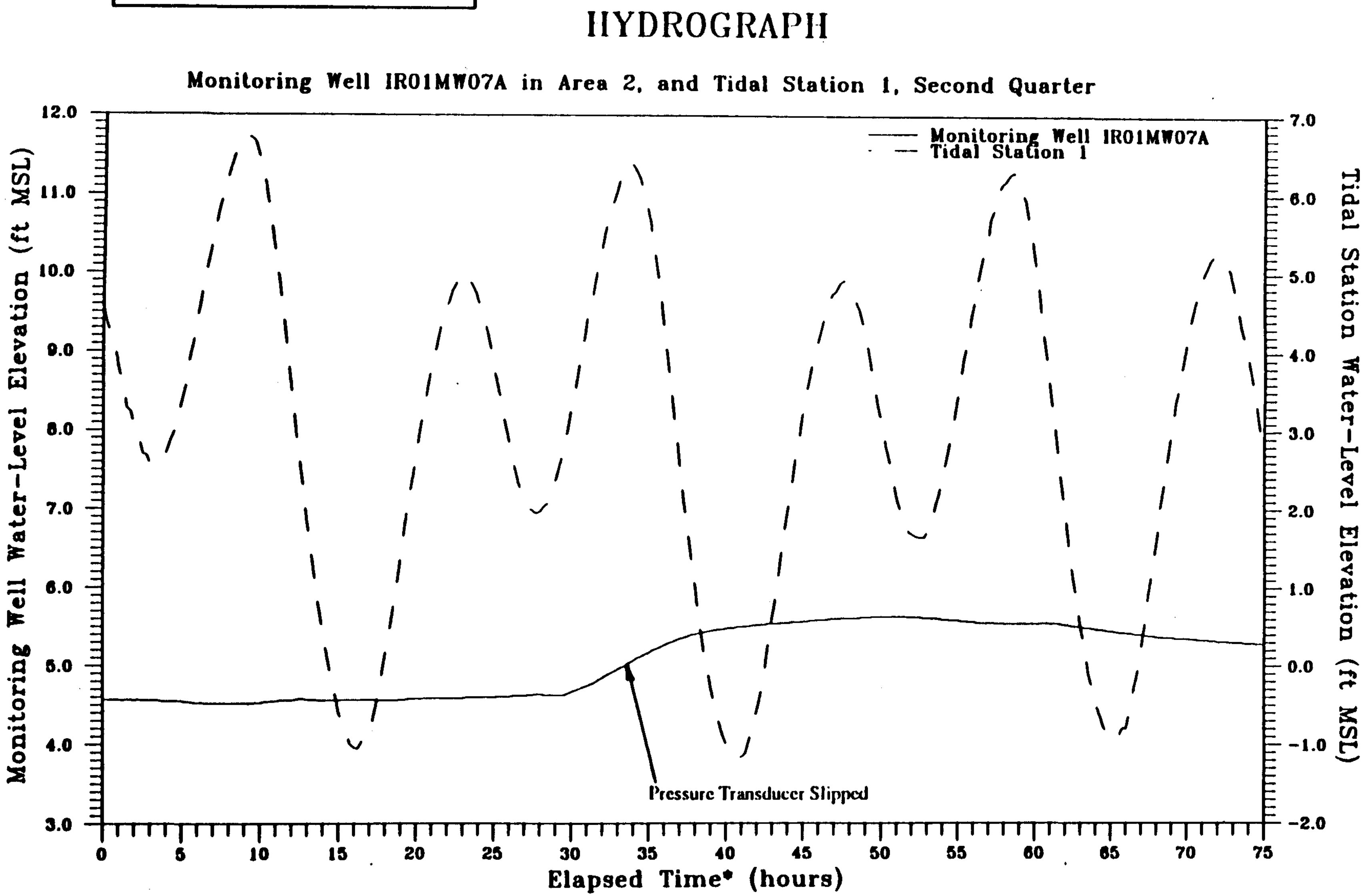
HYDROGRAPH

Monitoring Well IR01MW02B in Area 2, and Tidal Station 1, Second Quarter



* Monitoring Period began at 01:00am on 02/01/92

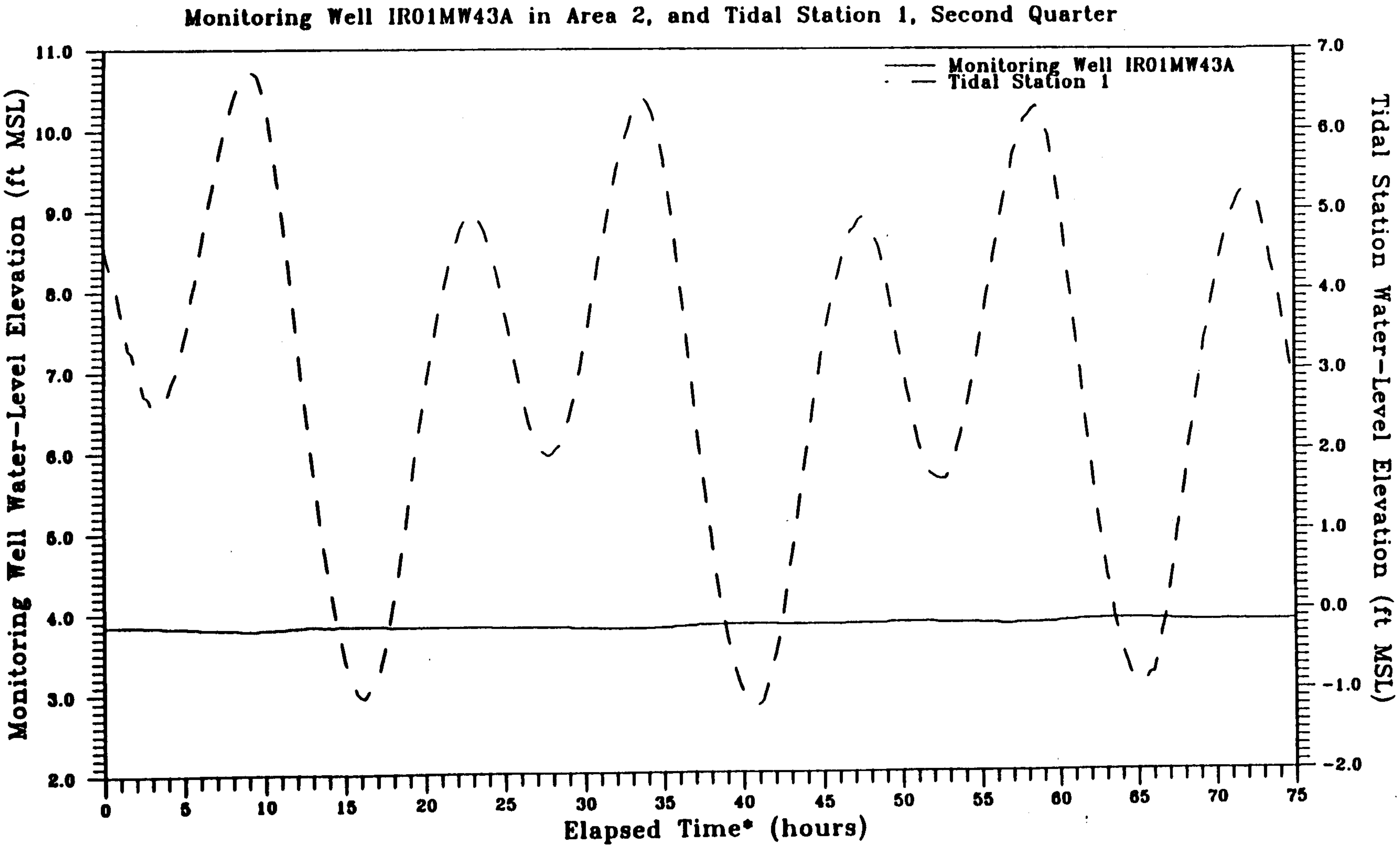
WL CHANGE	0.60	A
TDS	1,600	
SALINITY	980	



* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	0.12	A
TDS	8,200	
SALINITY	7,000	

HYDROGRAPH

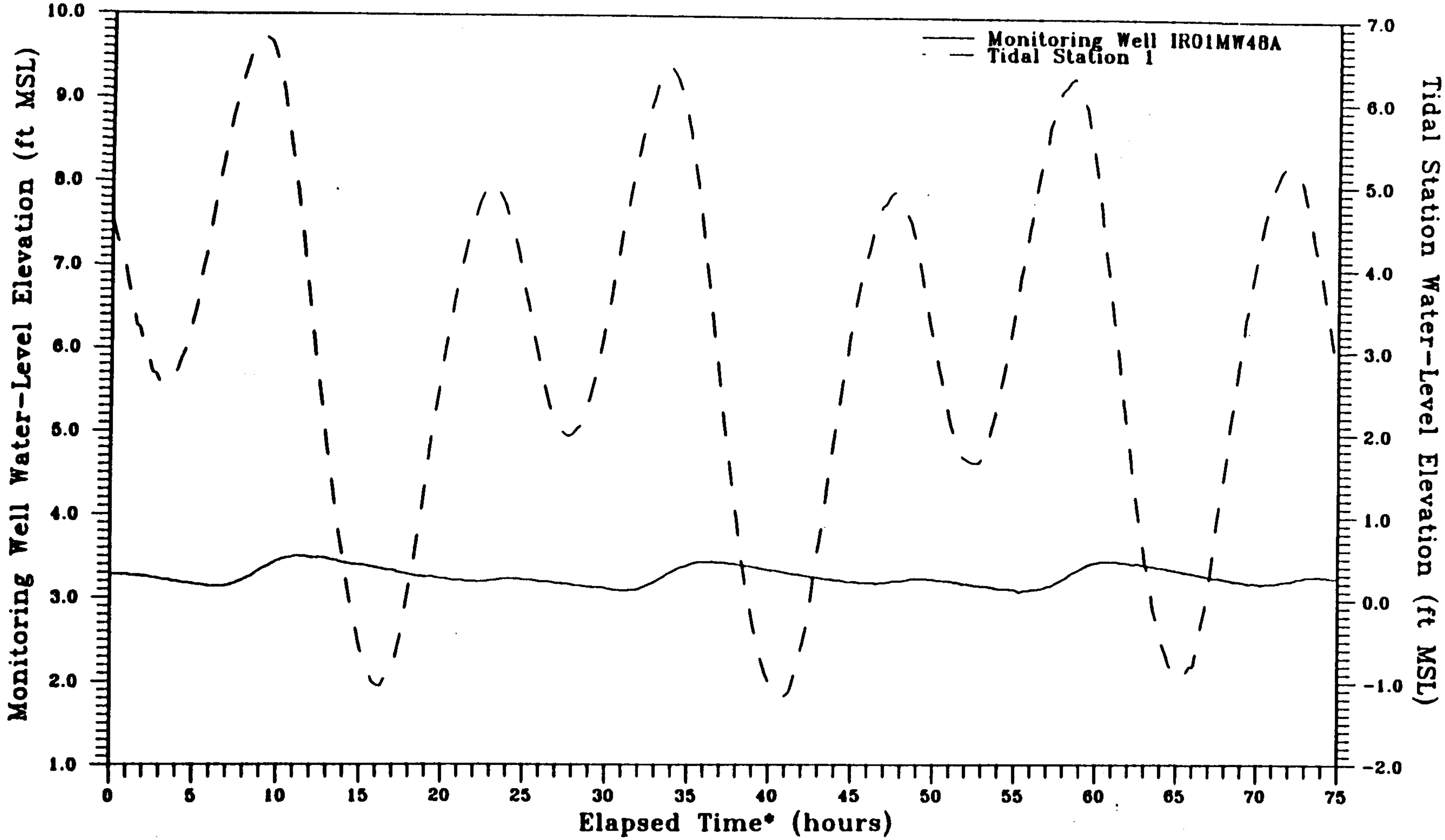


* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	0.51	A
TDS	5,500	
SALINITY	5,200	

HYDROGRAPH

Monitoring Well IR01MW48A in Area 2, and Tidal Station 1, Second Quarter

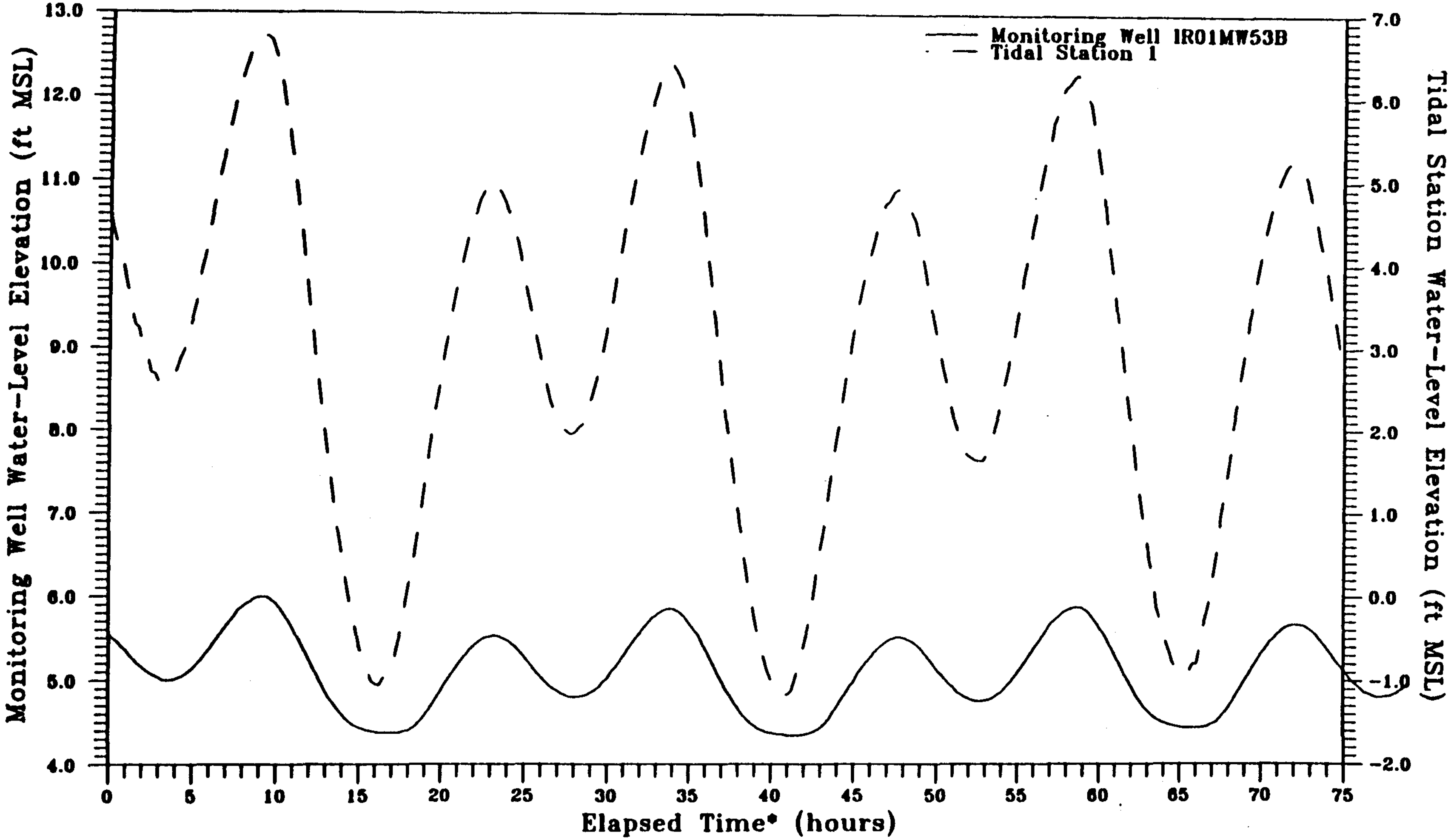


* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	1.61	A
TDS	2,700	
SALINITY	-	NA

HYDROGRAPH

Monitoring Well IR01MW53B in Area 2, and Tidal Station 1, Second Quarter

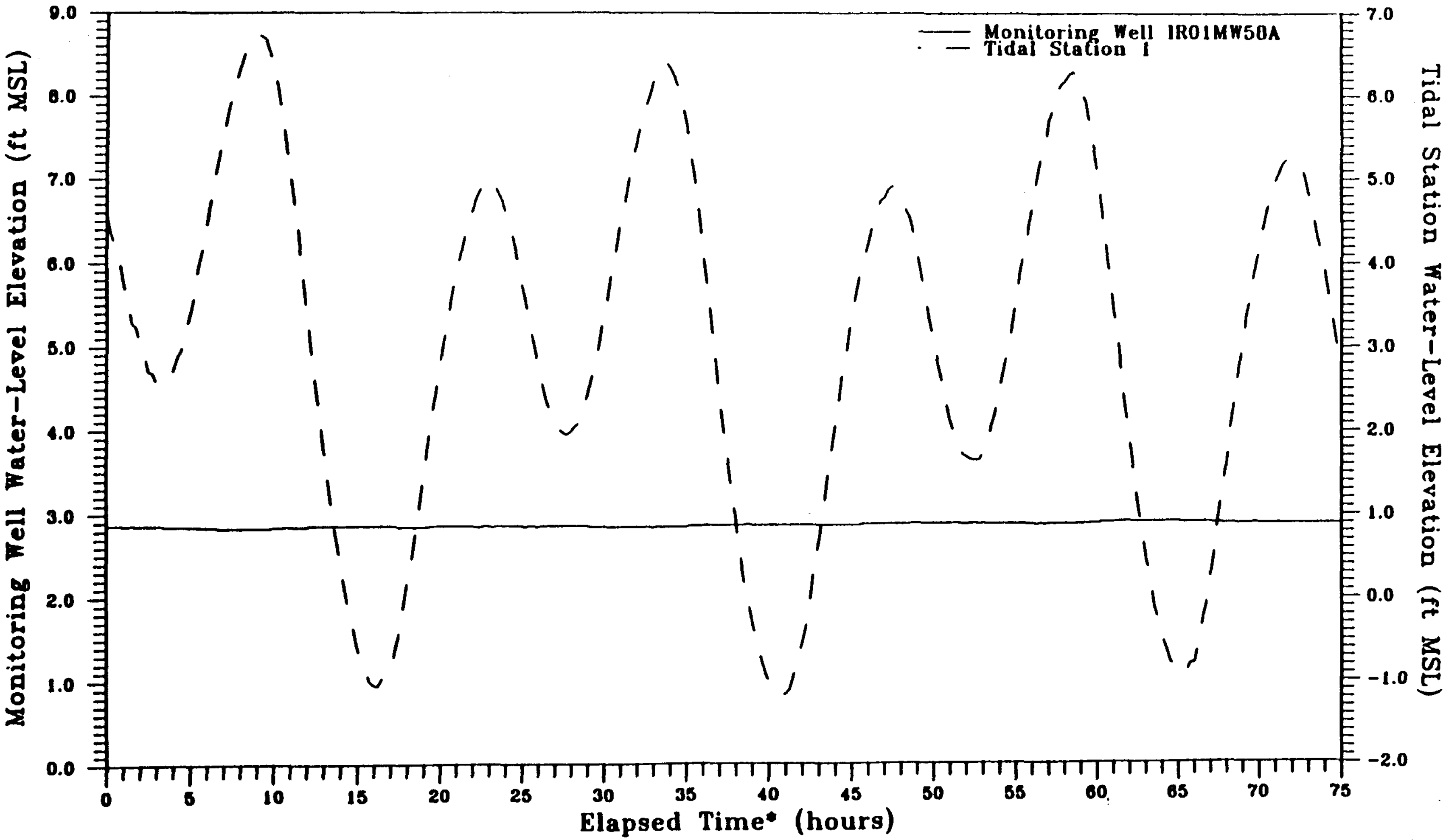


* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	0.07	A
TDS	5,100	
SALINITY	4,800	

HYDROGRAPH

Monitoring Well IR01MW58A in Area 2, and Tidal Station 1, Second Quarter

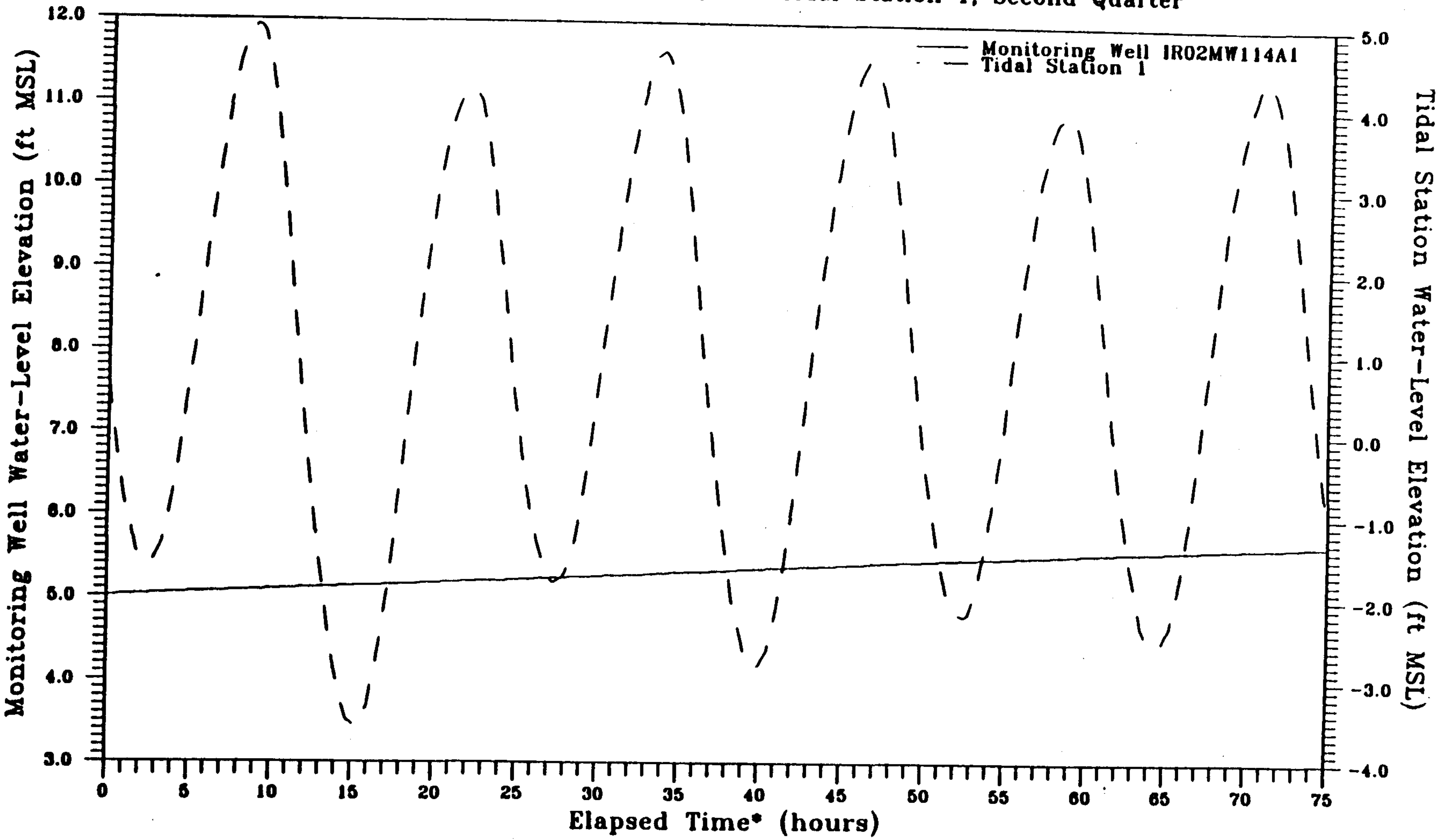


* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	0.67	Q2
TDS	-	NS
SALINITY	-	NS

HYDROGRAPH

Monitoring Well IR02MW114A1 in Area 3, and Tidal Station 1, Second Quarter

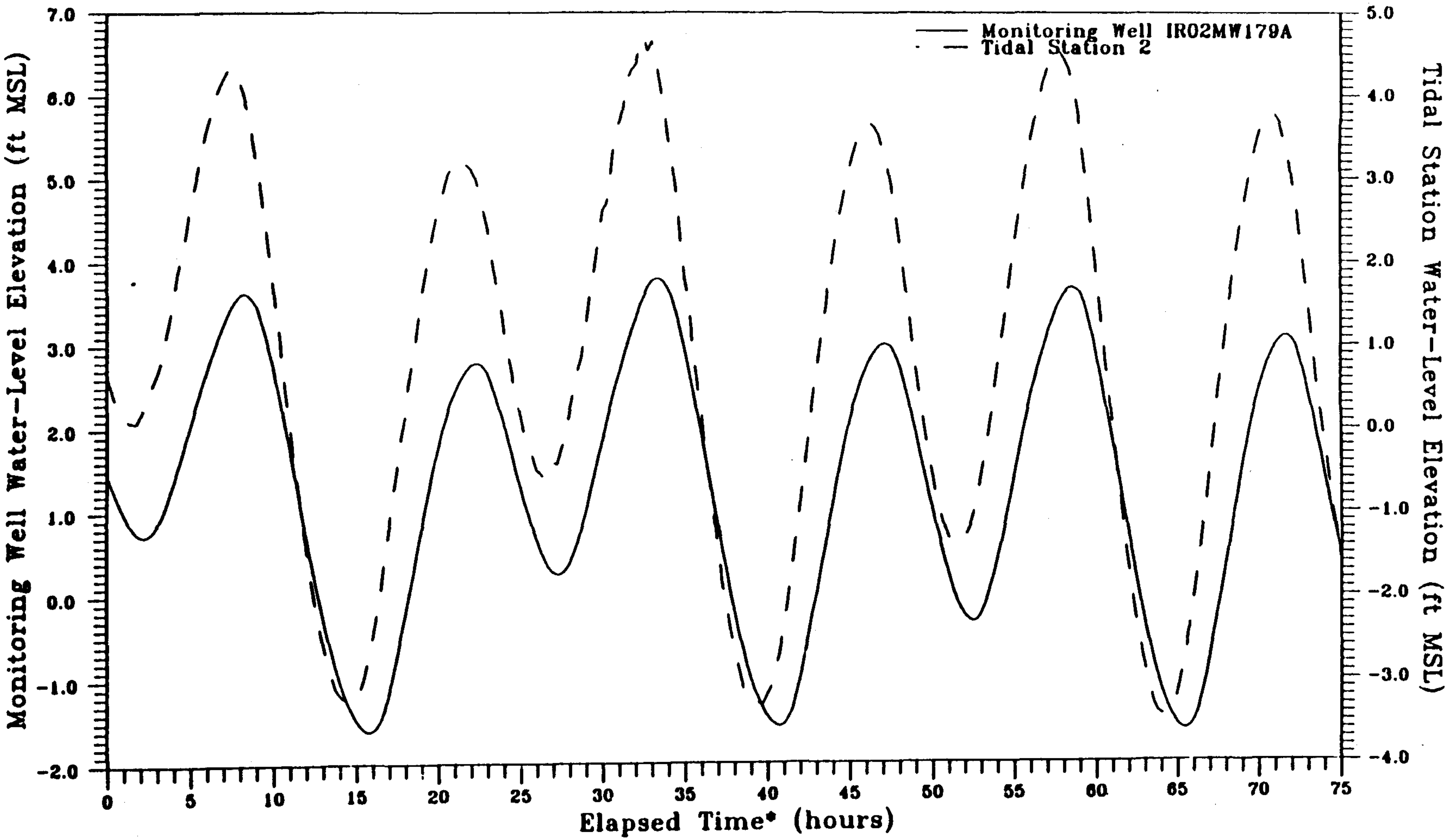


* Monitoring Period began at 03:00am on 02/18/92

WL CHANGE	5.70	A
TDS	32,000	
SALINITY	24,000	

HYDROGRAPH

Monitoring Well IR02MW179A in Area 4, and Tidal Station 2, Second Quarter

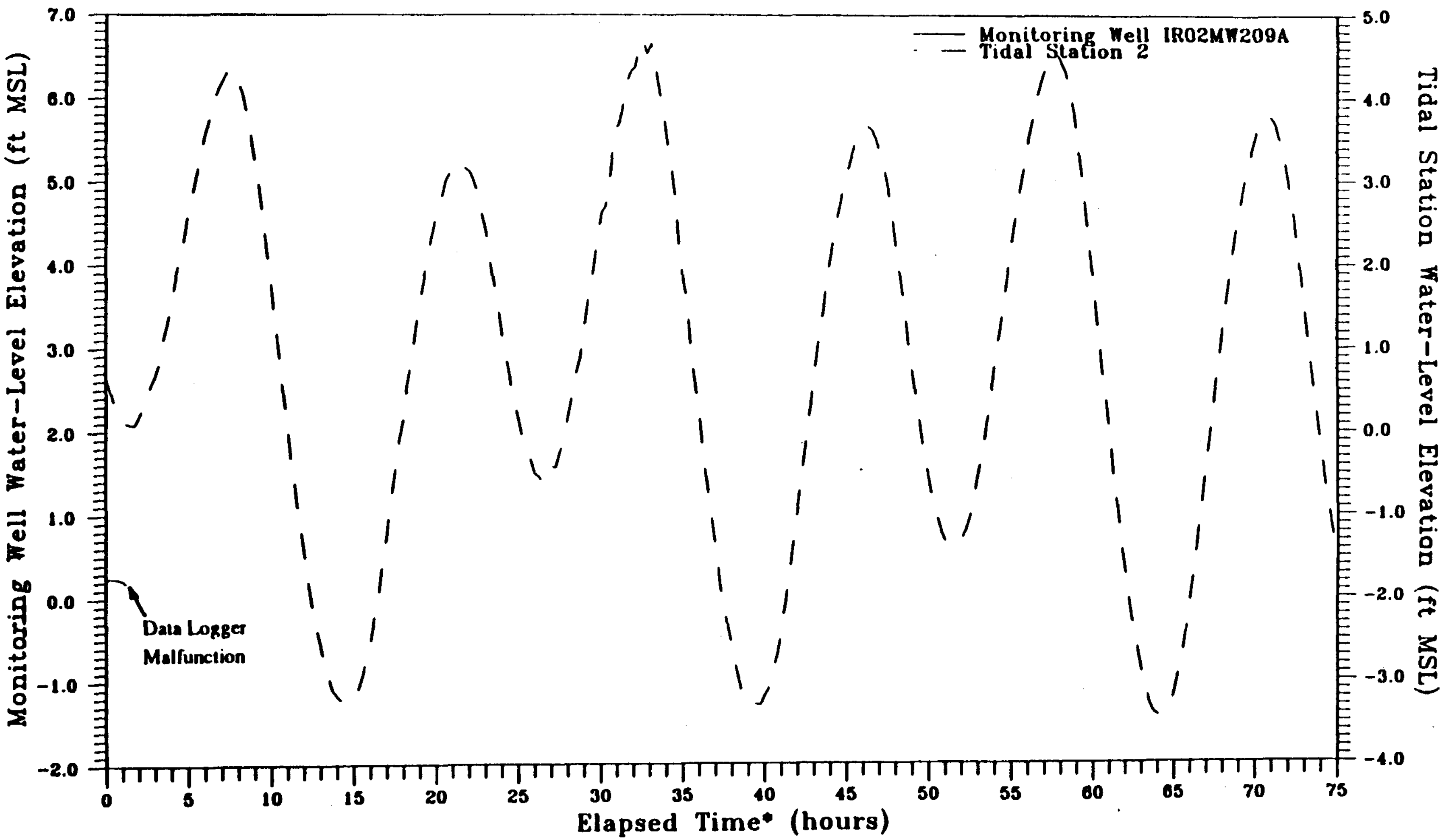


* Monitoring Period began at 00:15am on 03/14/92

WL CHANGE	1.58	Q1
TDS	34,000	
SALINITY	25,000	

HYDROGRAPH

Monitoring Well IR02MW209A in Area 4, and Tidal Station 2, Second Quarter

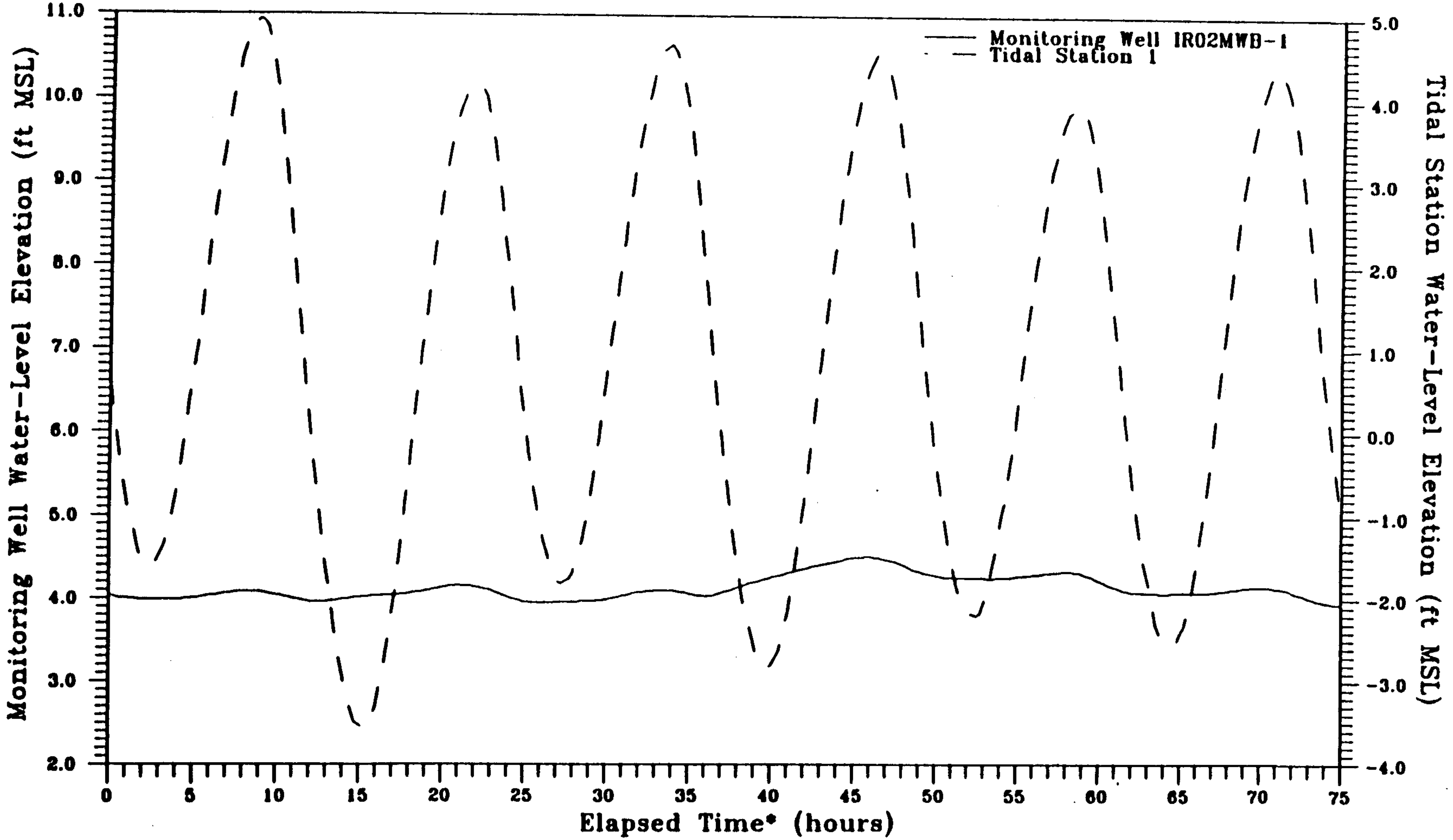


* **Monitoring Period began at 00:15am on 03/14/92**

WL CHANGE	0.51	A
TDS	19,000	
SALINITY	13,000	

HYDROGRAPH

Monitoring Well IR02MWB-1 in Area 3, and Tidal Station 1, Second Quarter

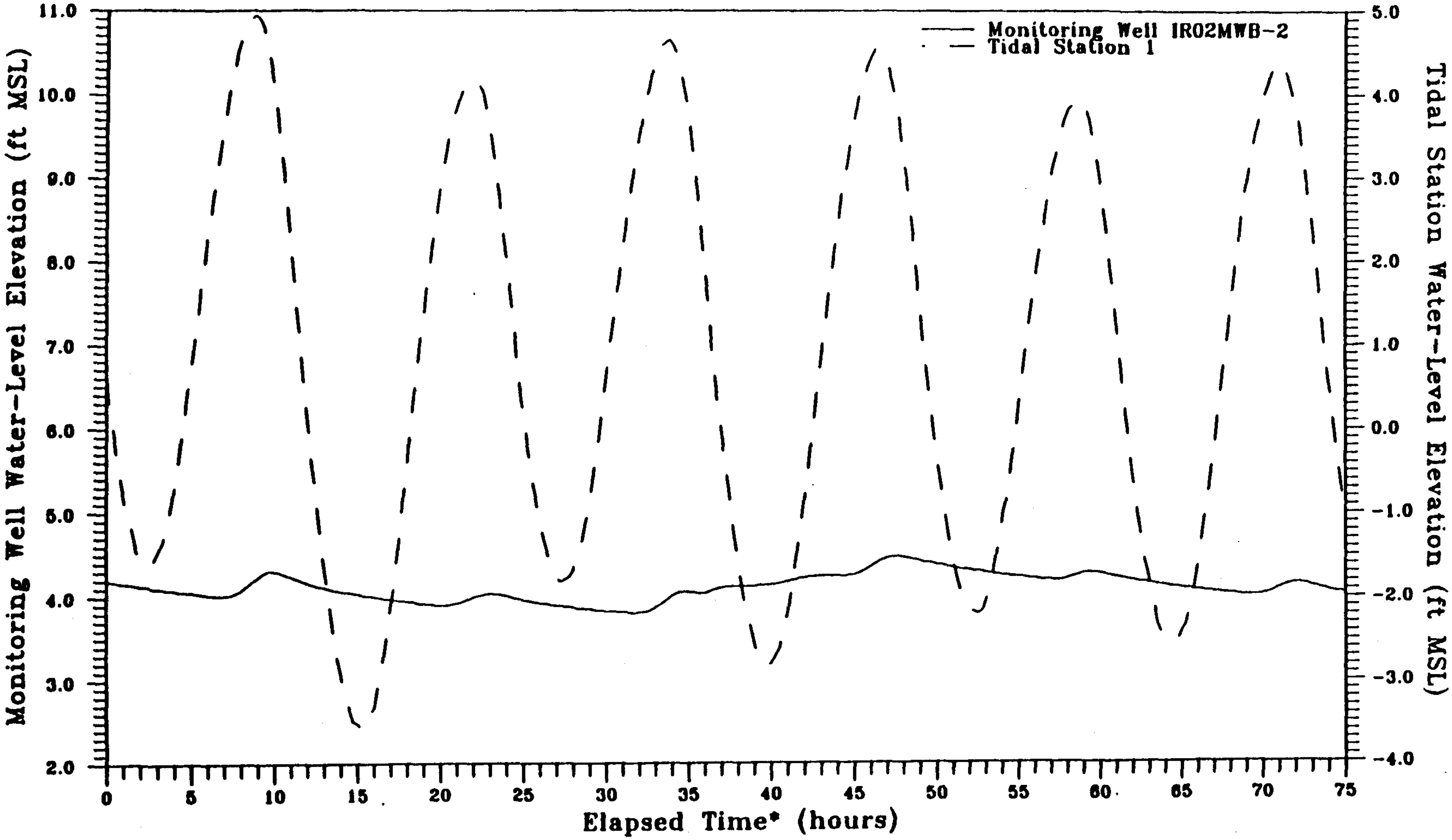


* Monitoring Period began at 03:00am on 02/18/92

WL CHANGE	0.68	A
TDS	20,000	
SALINITY	24,000	

HYDROGRAPH

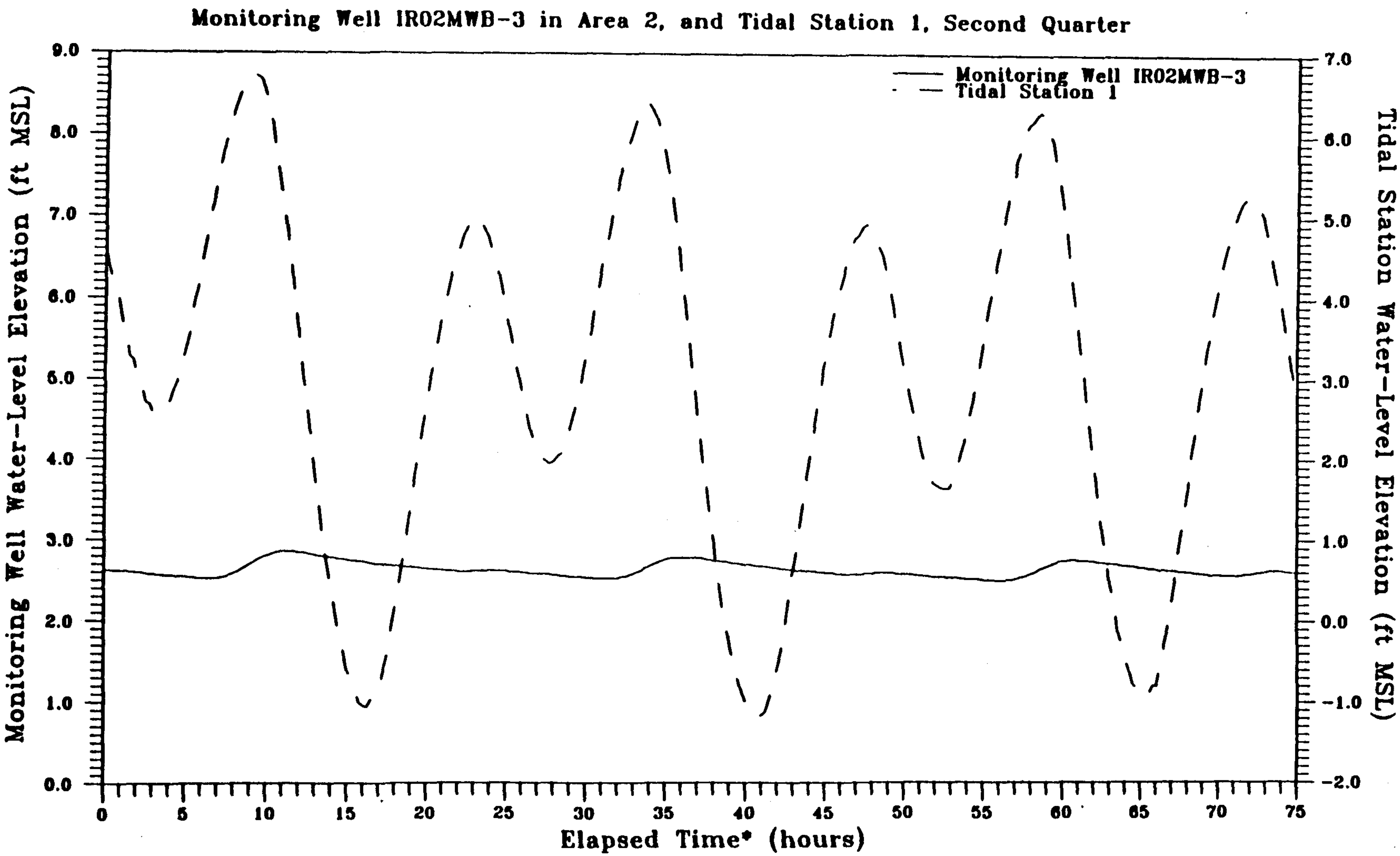
Monitoring Well IR02MWB-2 in Area 3, and Tidal Station 1, Second Quarter



* Monitoring Period began at 03:00am on 02/18/92

WL CHANGE	0.37	A
TDS	14,000	
SALINITY	11,000	

HYDROGRAPH

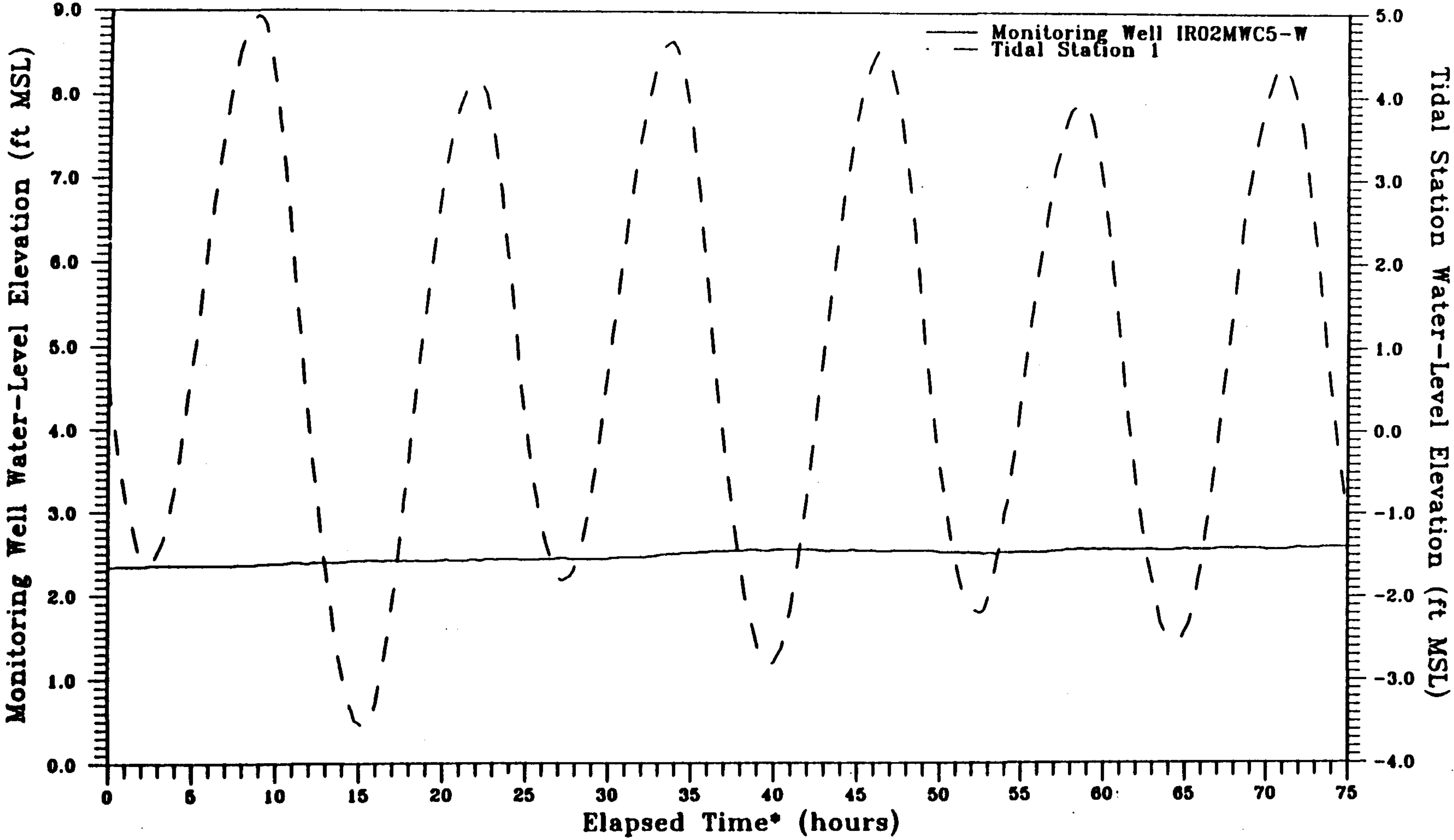


* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	0.26	Q2
TDS	9,400	
SALINITY	8,800	

HYDROGRAPH

Monitoring Well IR02MWC5-W in Area 3, and Tidal Station 1, Second Quarter

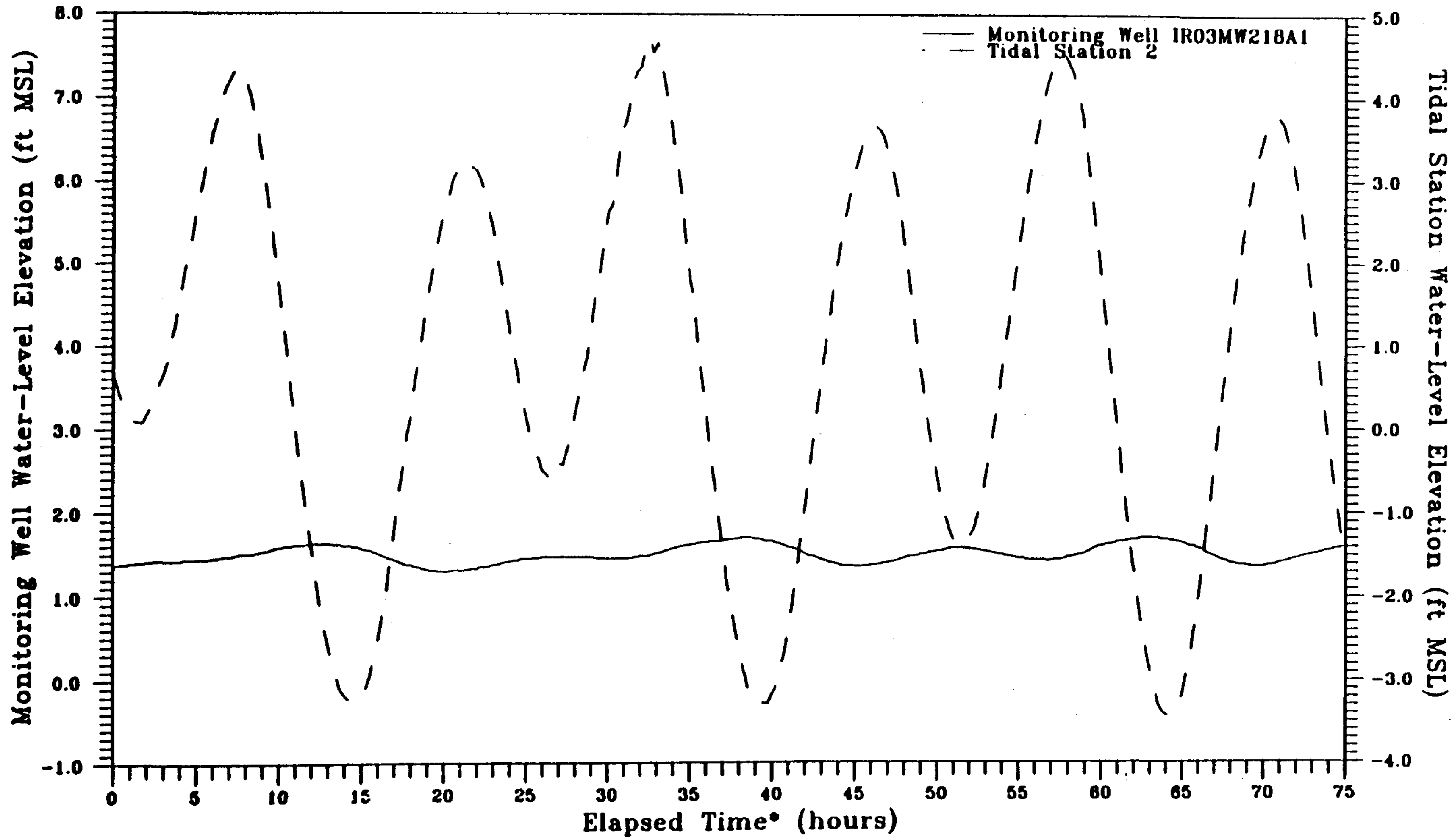


* Monitoring Period began at 03:00am on 02/18/92

WL CHANGE	0.44	A
TDS	17,000	
SALINITY	14,000	

HYDROGRAPH

Monitoring Well IR03MW218A1 in Area 4, and Tidal Station 2, Second Quarter

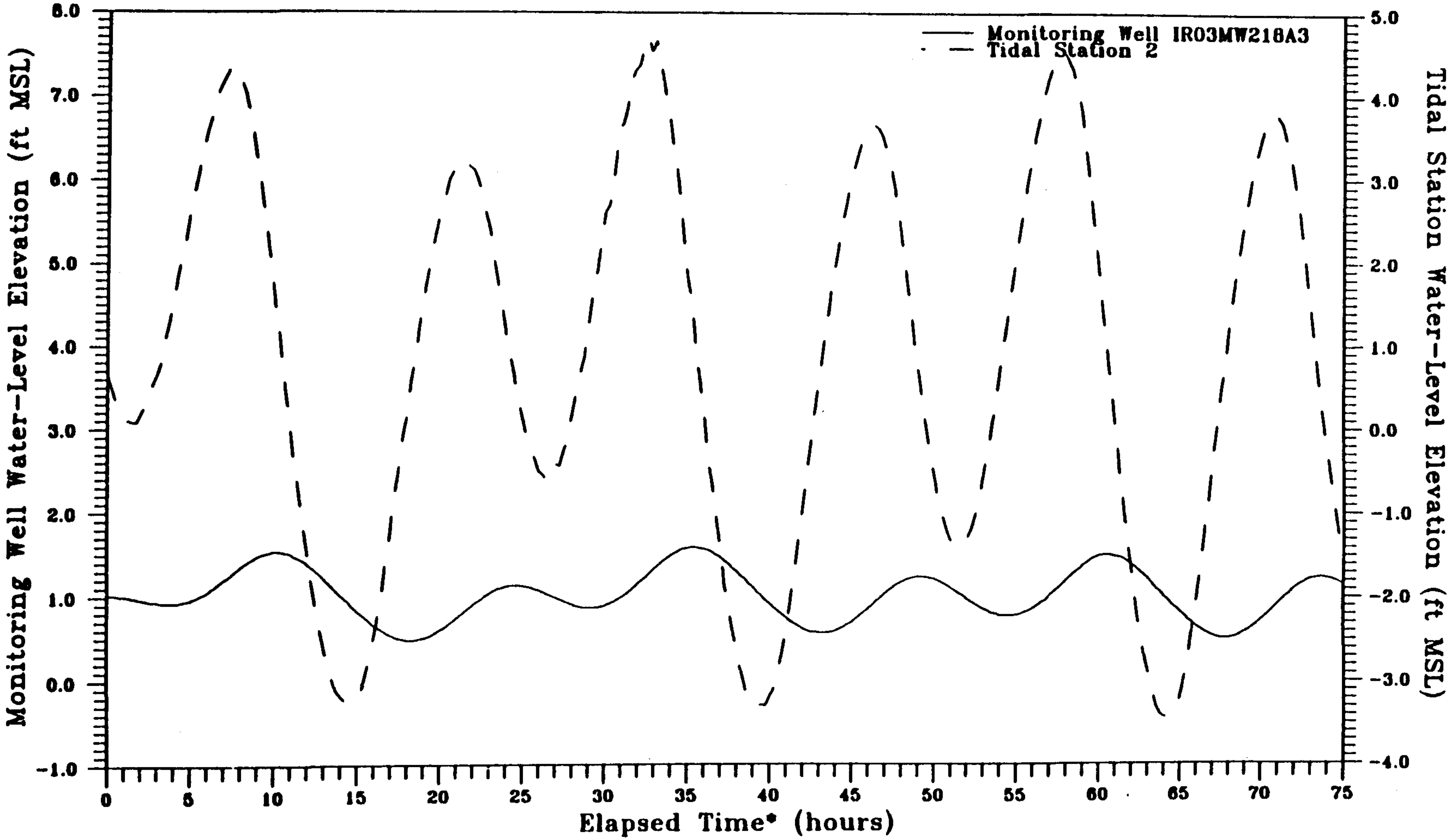


* Monitoring Period began at 00:15am on 03/14/92

WL CHANGE	1.04	A
TDS	23,000	
SALINITY	NA	

HYDROGRAPH

Monitoring Well IR03MW218A3 in Area 4, and Tidal Station 2, Second Quarter

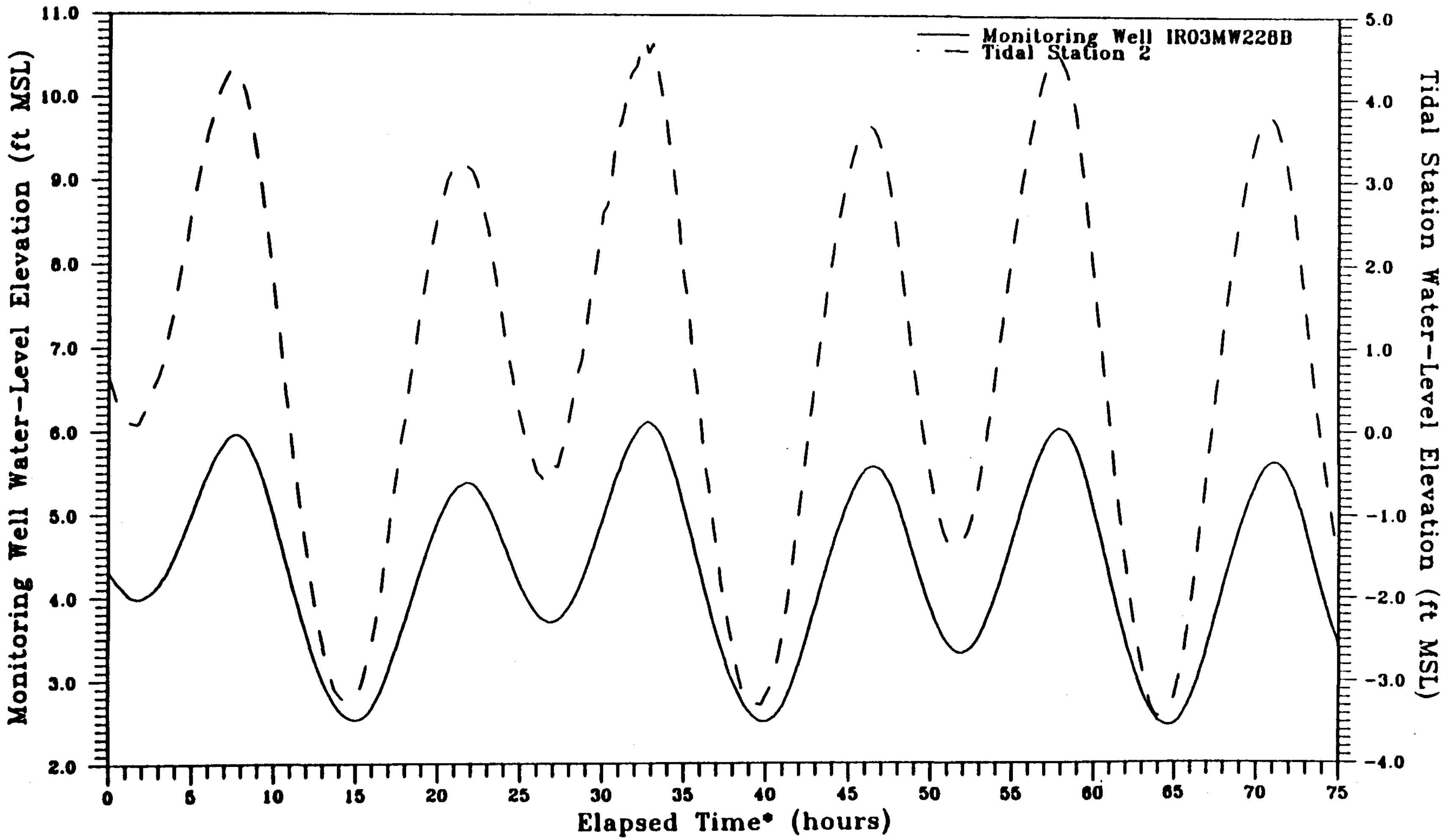


* Monitoring Period began at 00:15am on 03/14/92

WL CHANGE	3.66	A
TDS	680	
SALINITY	460	

HYDROGRAPH

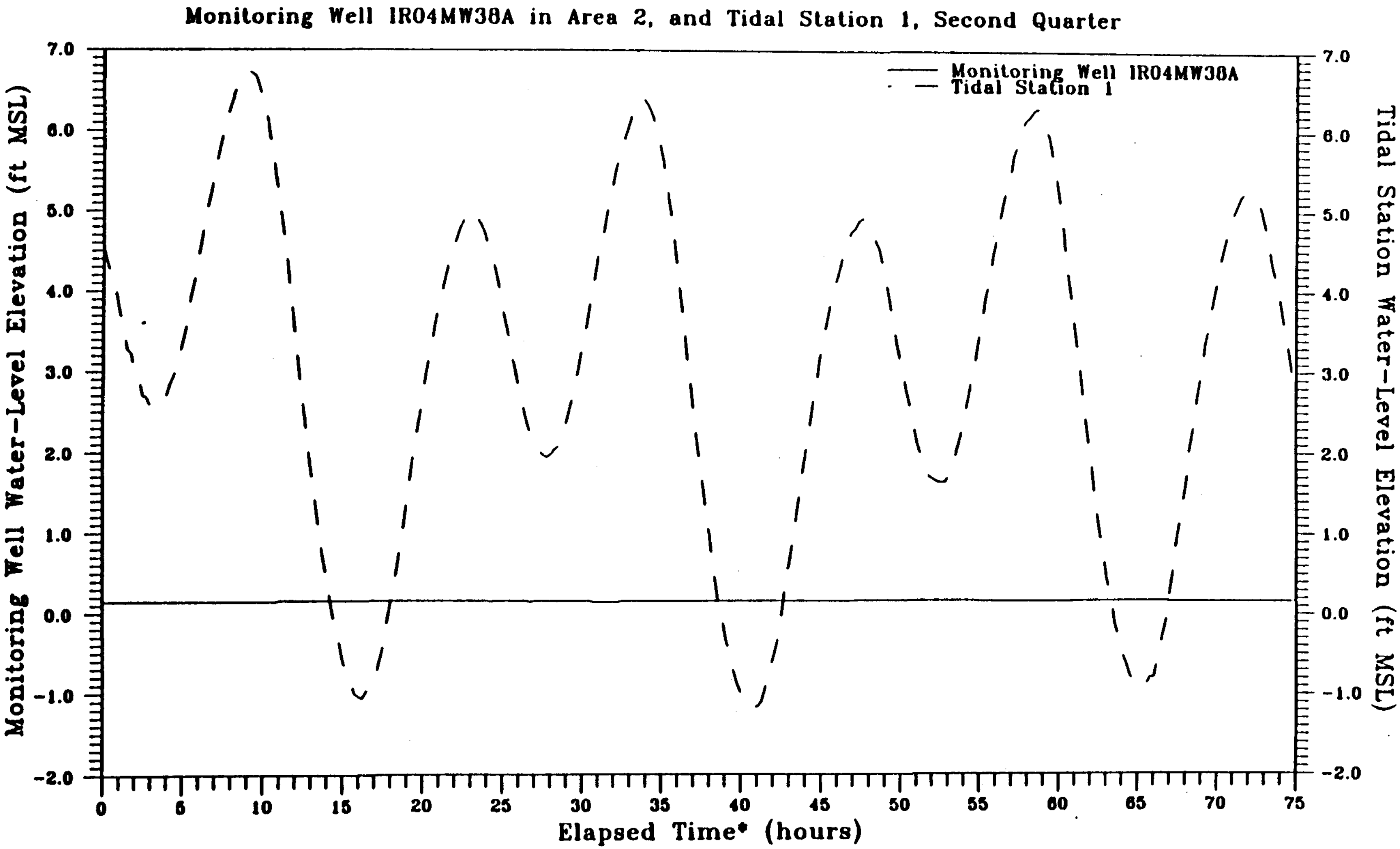
Monitoring Well IR03MW228B in Area 4, and Tidal Station 2, Second Quarter



* Monitoring Period began at 00:15am on 03/14/92

WL CHANGE	0.04	A
TDS	1,200	
SALINITY	860	

HYDROGRAPH

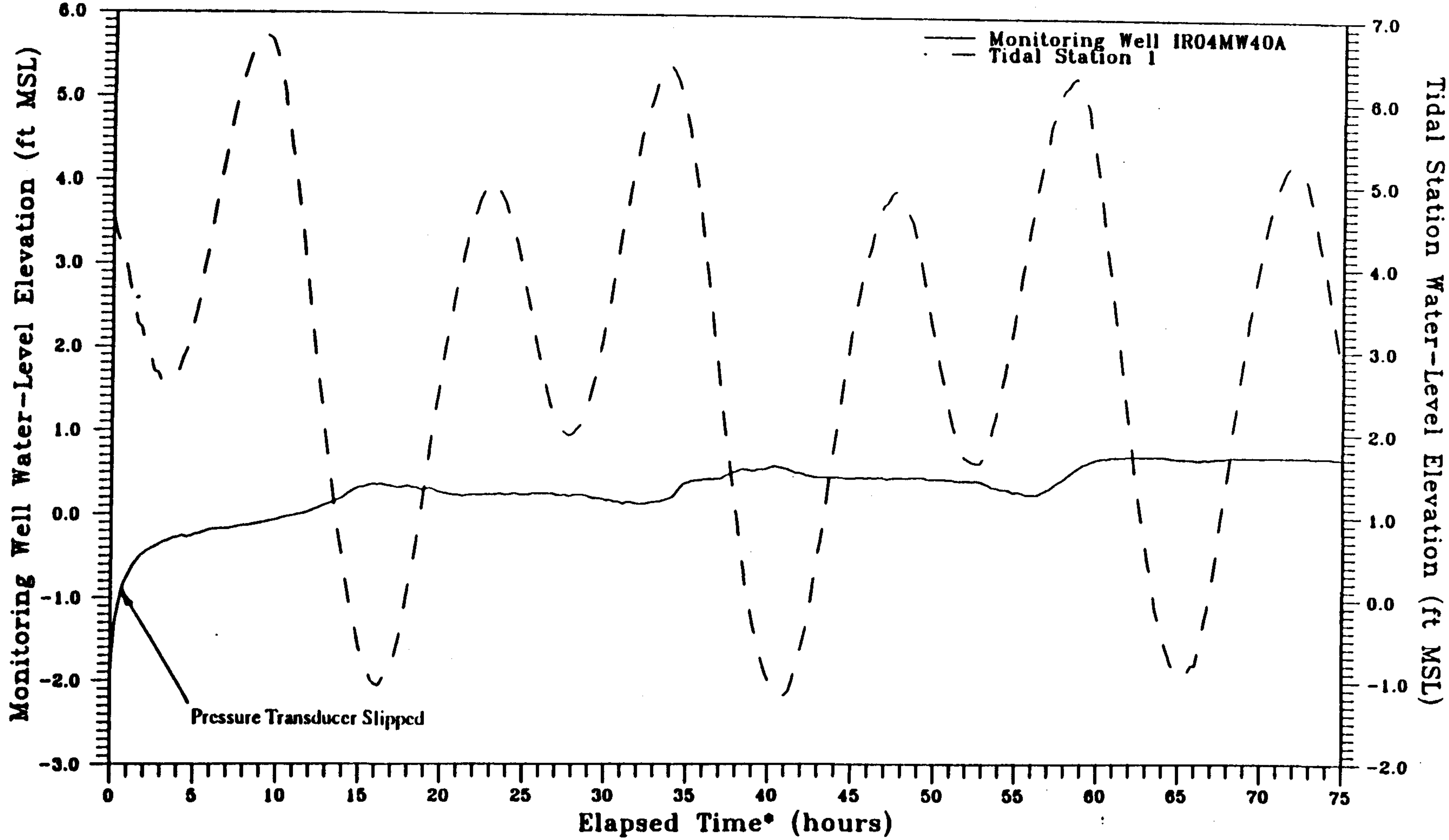


* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	1.31	A
TDS	17,000	
SALINITY	15,000	

HYDROGRAPH

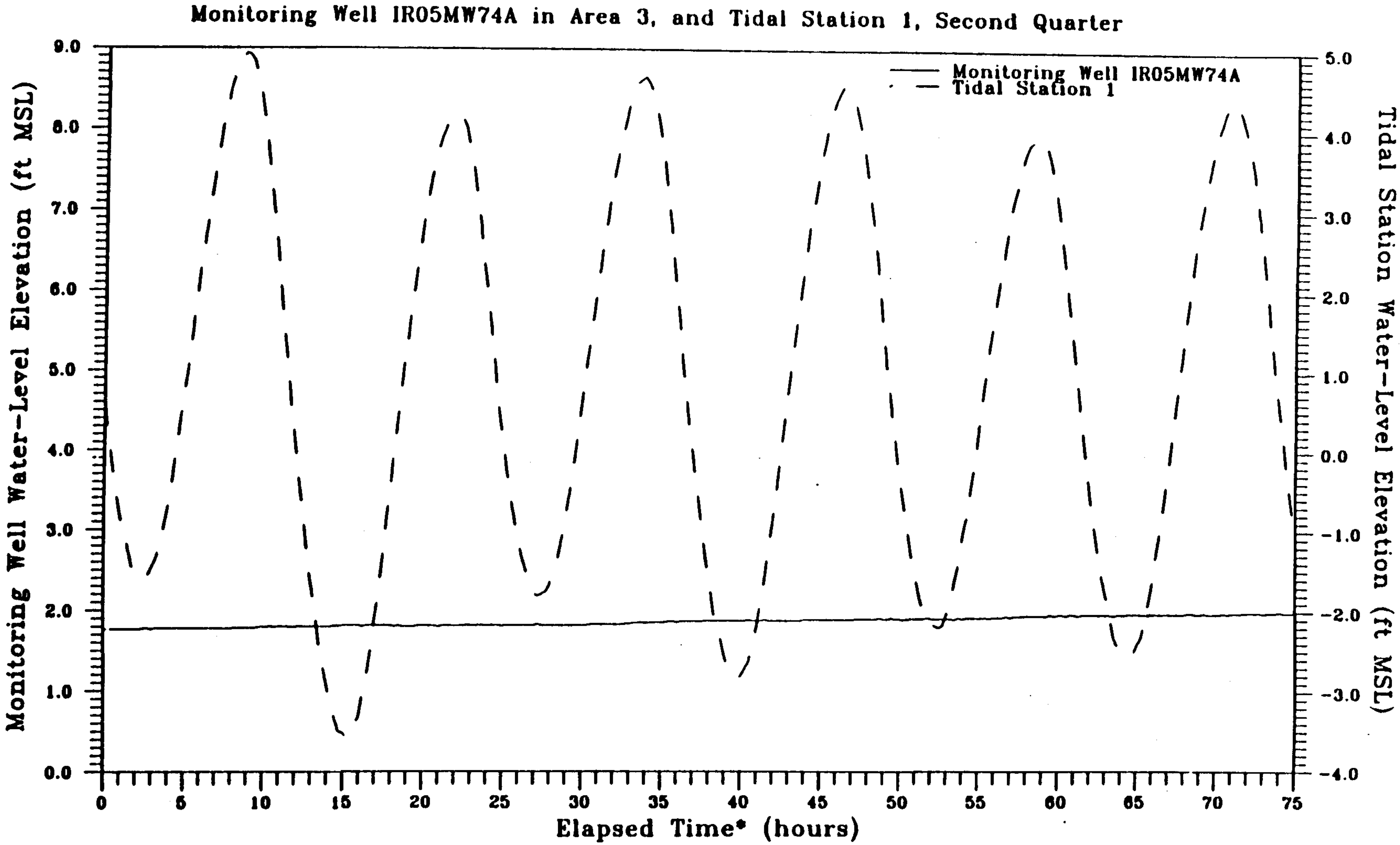
Monitoring Well IR04MW40A in Area 2, and Tidal Station 1, Second Quarter



* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	0.14	A
TDS	9,000	
SALINITY	7,800	

HYDROGRAPH

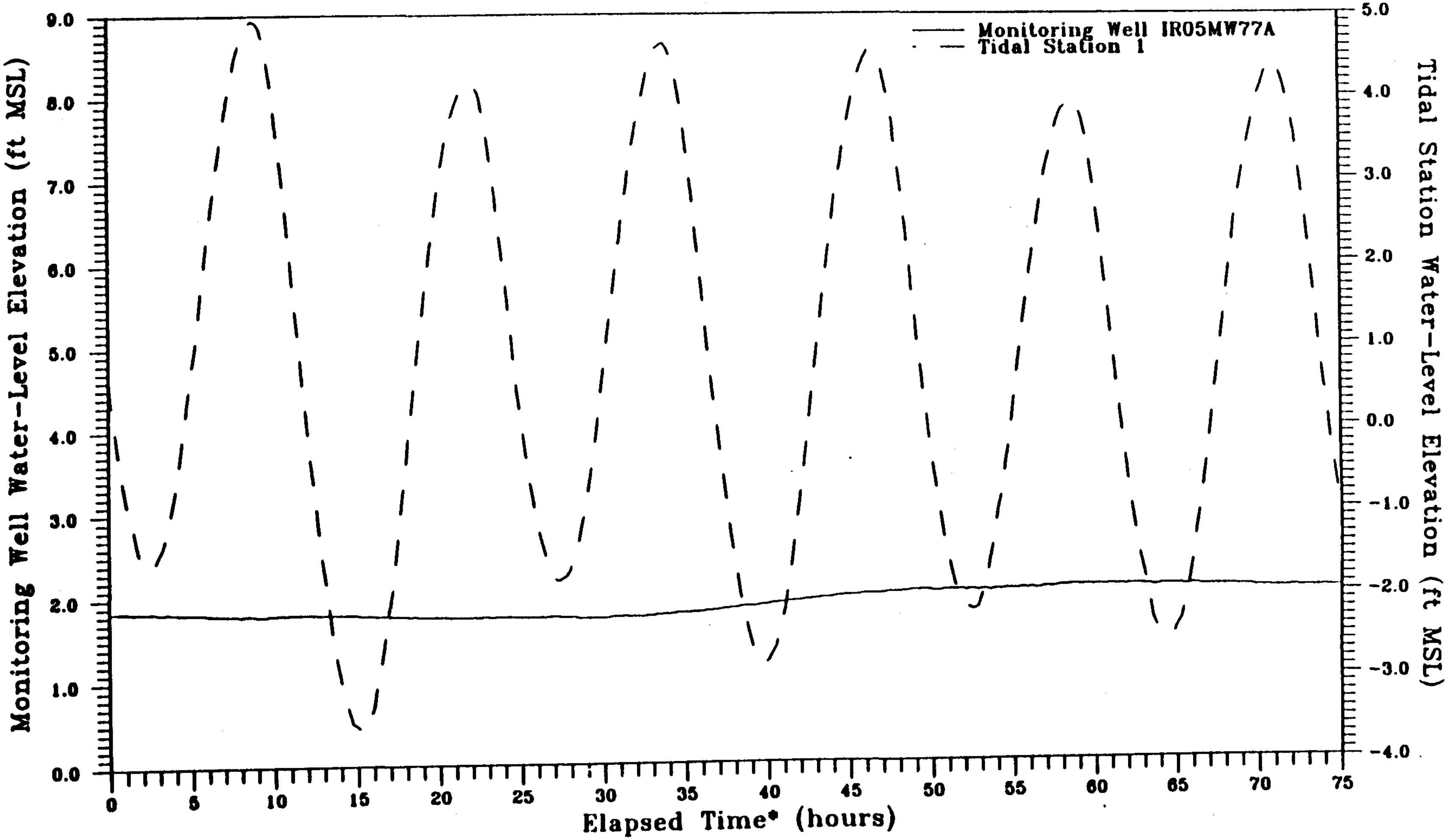


* Monitoring Period began at 03:00am on 02/18/92

WL CHANGE	0.21	A
TDS	5,700	
SALINITY	4,100	

HYDROGRAPH

Monitoring Well IR05MW77A in Area 3, and Tidal Station 1, Second Quarter

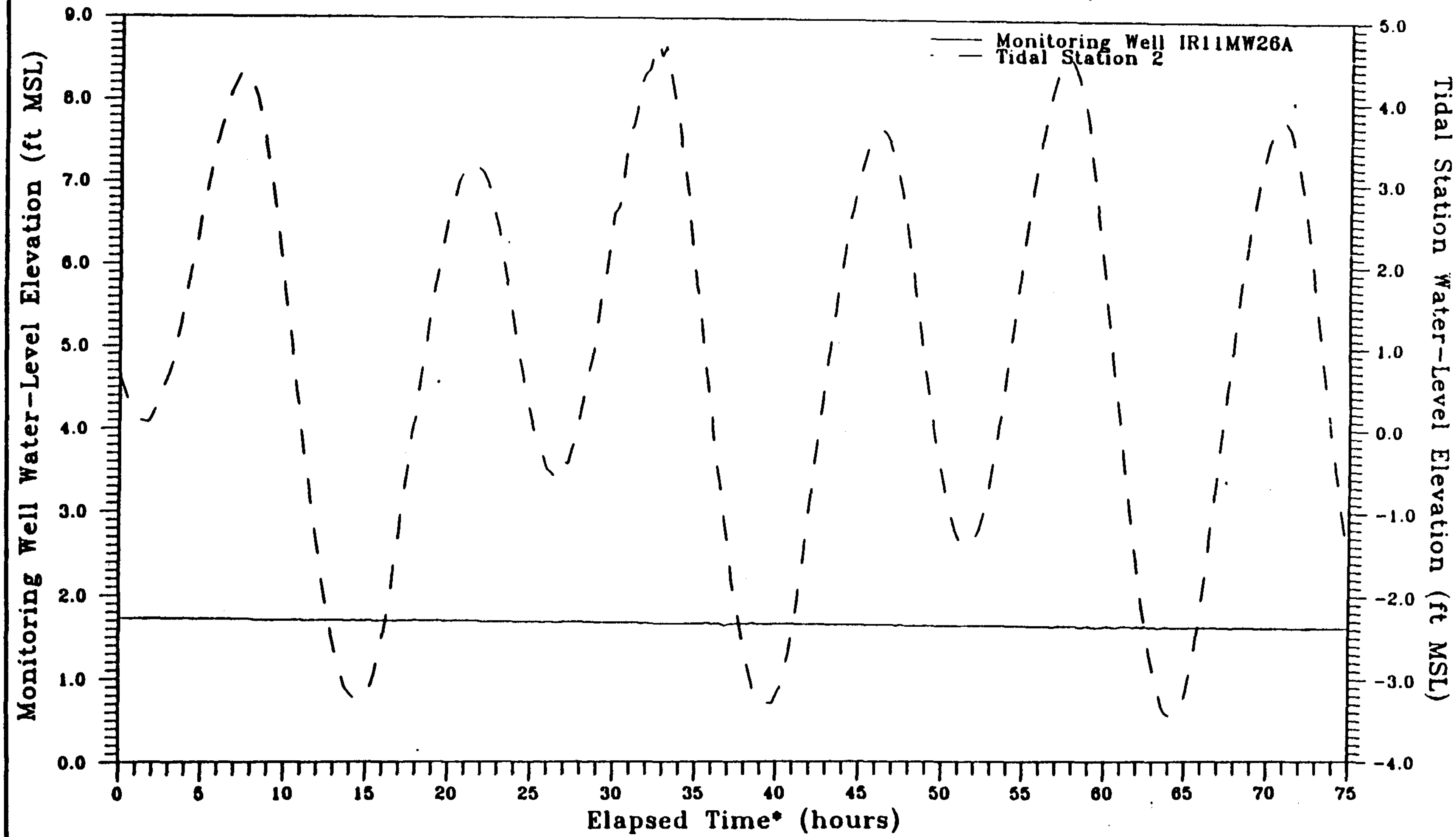


* Monitoring Period began at 03:00am on 02/18/92

WL CHANGE	0.09	A
TDS	4,400	
SALINITY	3,200	

HYDROGRAPH

Monitoring Well IR11MW26A in Area 4, and Tidal Station 2, Second Quarter



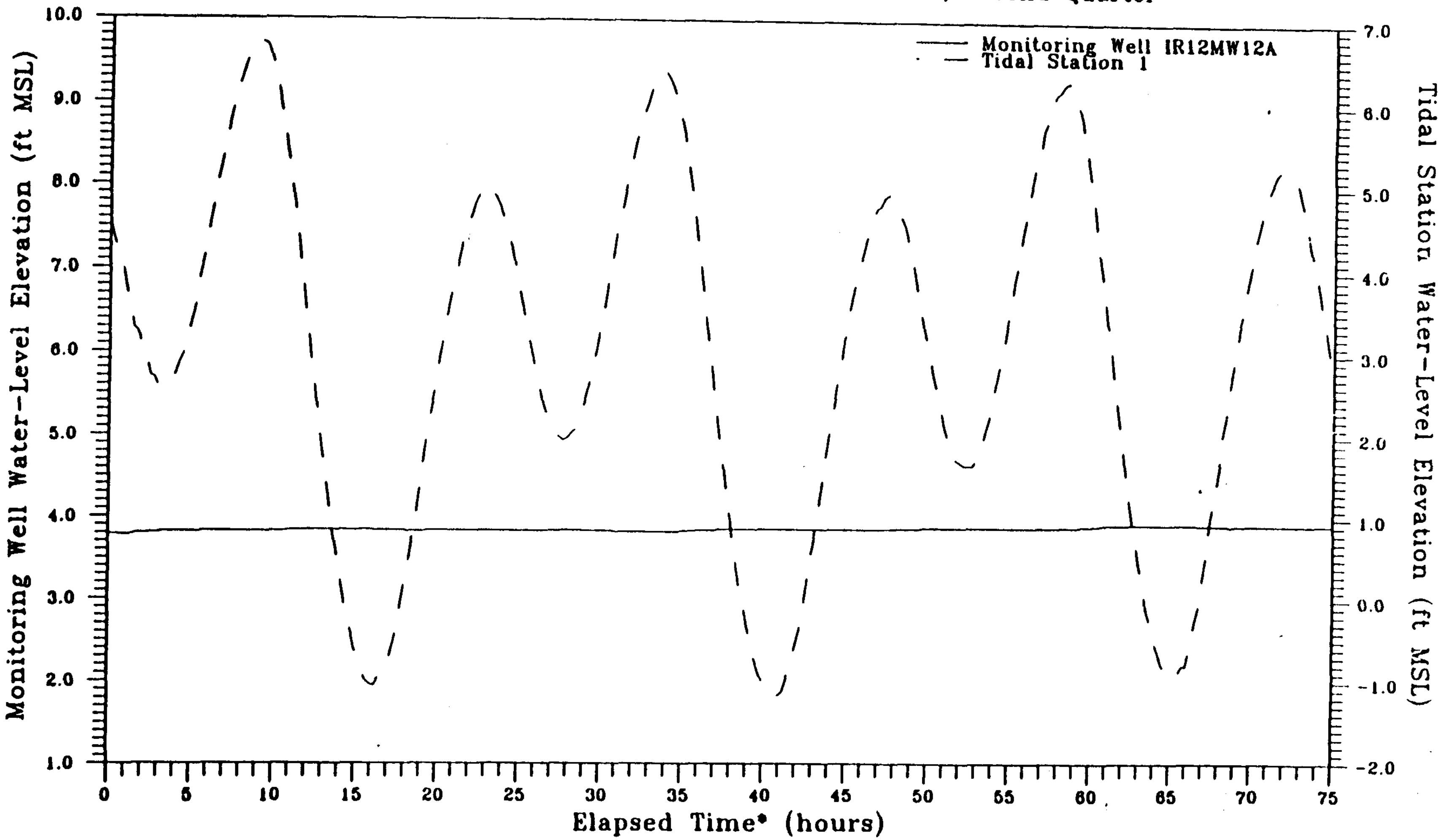
* Monitoring Period began at 00:15am on 03/14/92

DIETERICH-POST 130713

WL CHANGE	0.10	A
TDS	600	
SALINITY	400	

HYDROGRAPH

Monitoring Well IR12MW12A in Area 2, and Tidal Station 1, Second Quarter



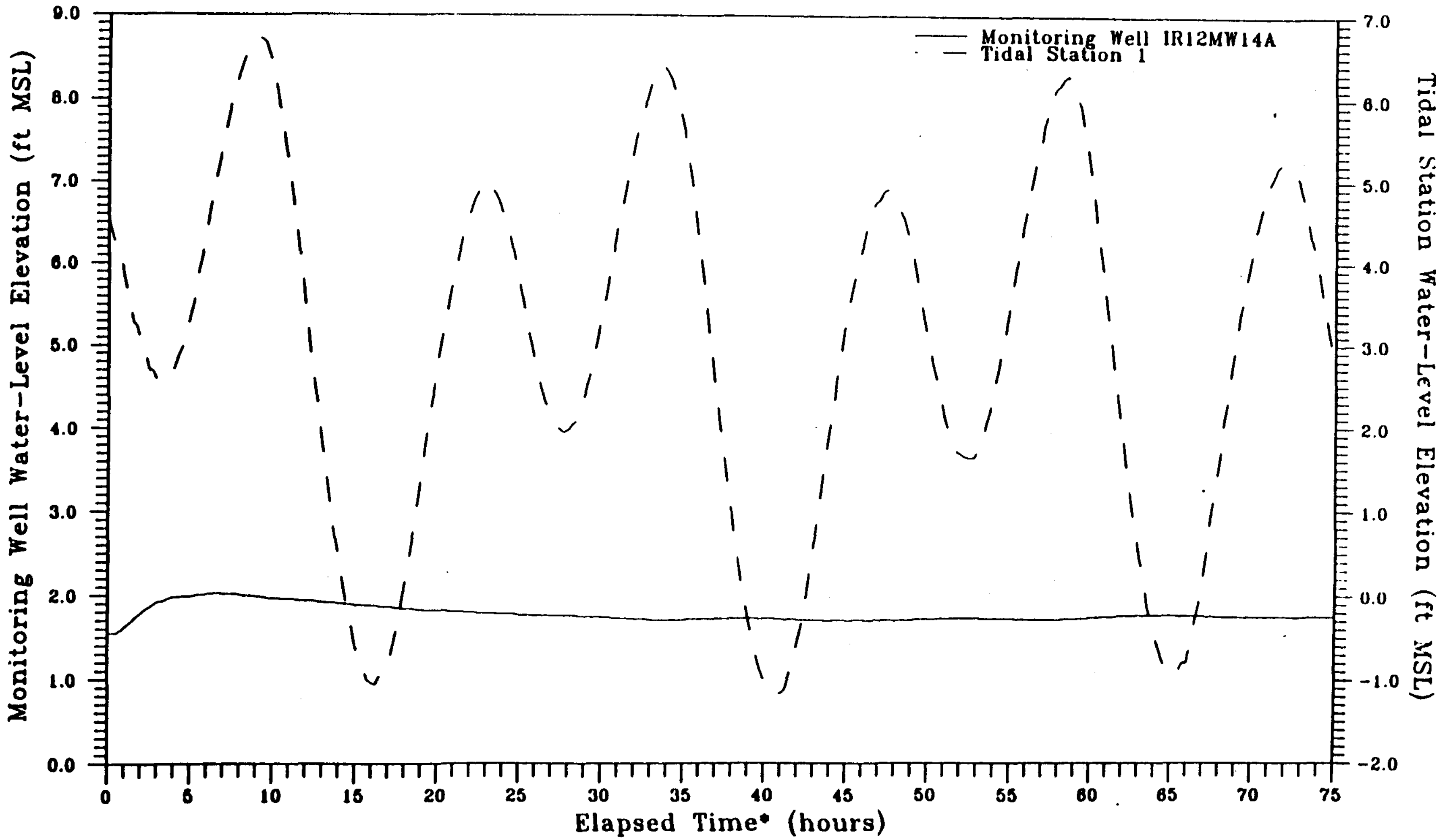
* Monitoring Period began at 01:00am on 02/01/92

DIETERICH-POST 130713

WL CHANGE	0.28	A
TDS	1,200	
SALINITY	770	

HYDROGRAPH

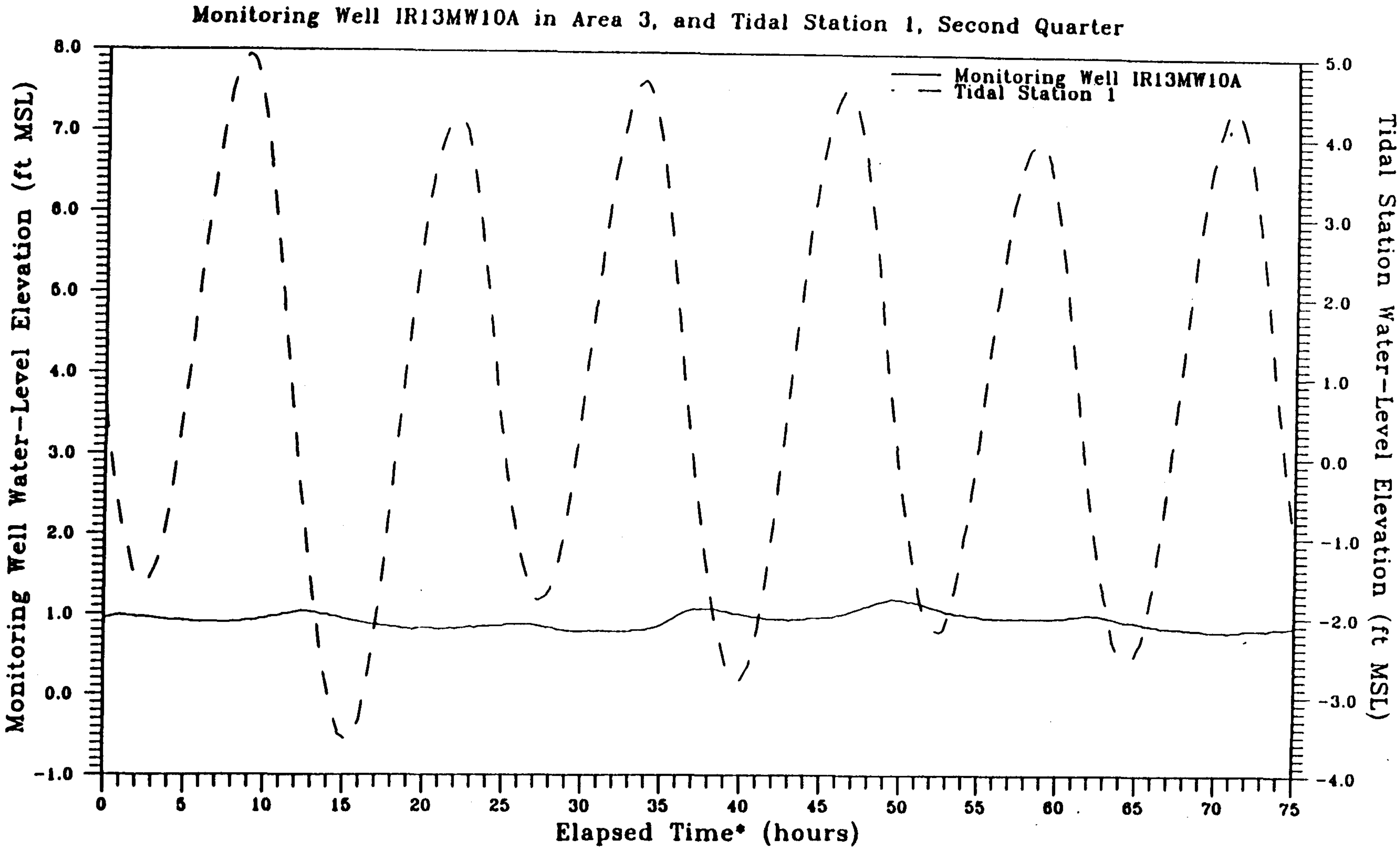
Monitoring Well IR12MW14A in Area 2, and Tidal Station 1, Second Quarter



* Monitoring Period began at 01:00am on 02/01/92

WL CHANGE	0.31	A
TDS	21,000	
SALINITY	17,000	

HYDROGRAPH

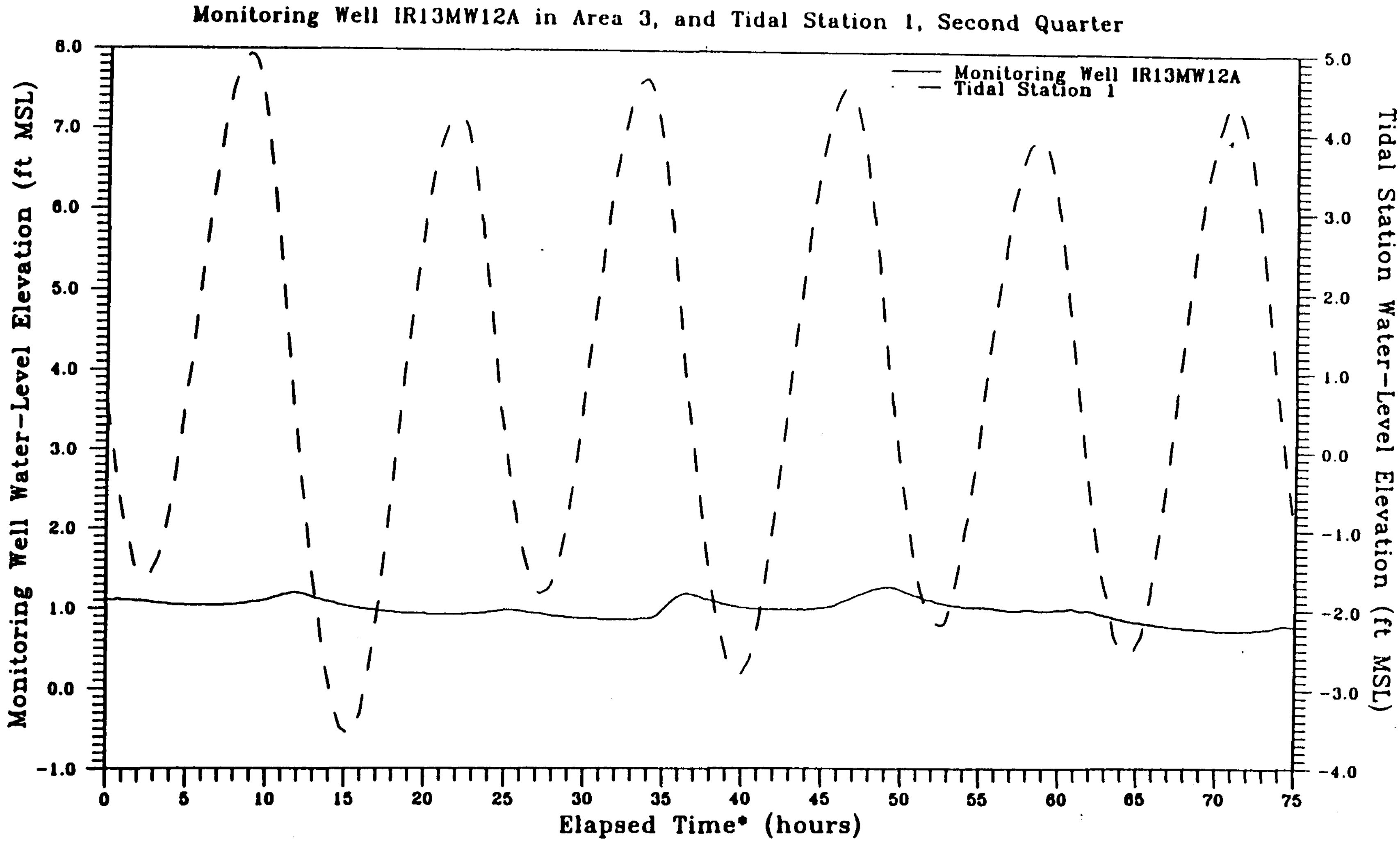


* Monitoring Period began at 03:00am on 02/18/92

DIETERCH-POST 130713

WL CHANGE	0.39	A
TDS	26,000	
SALINITY	20,000	

HYDROGRAPH

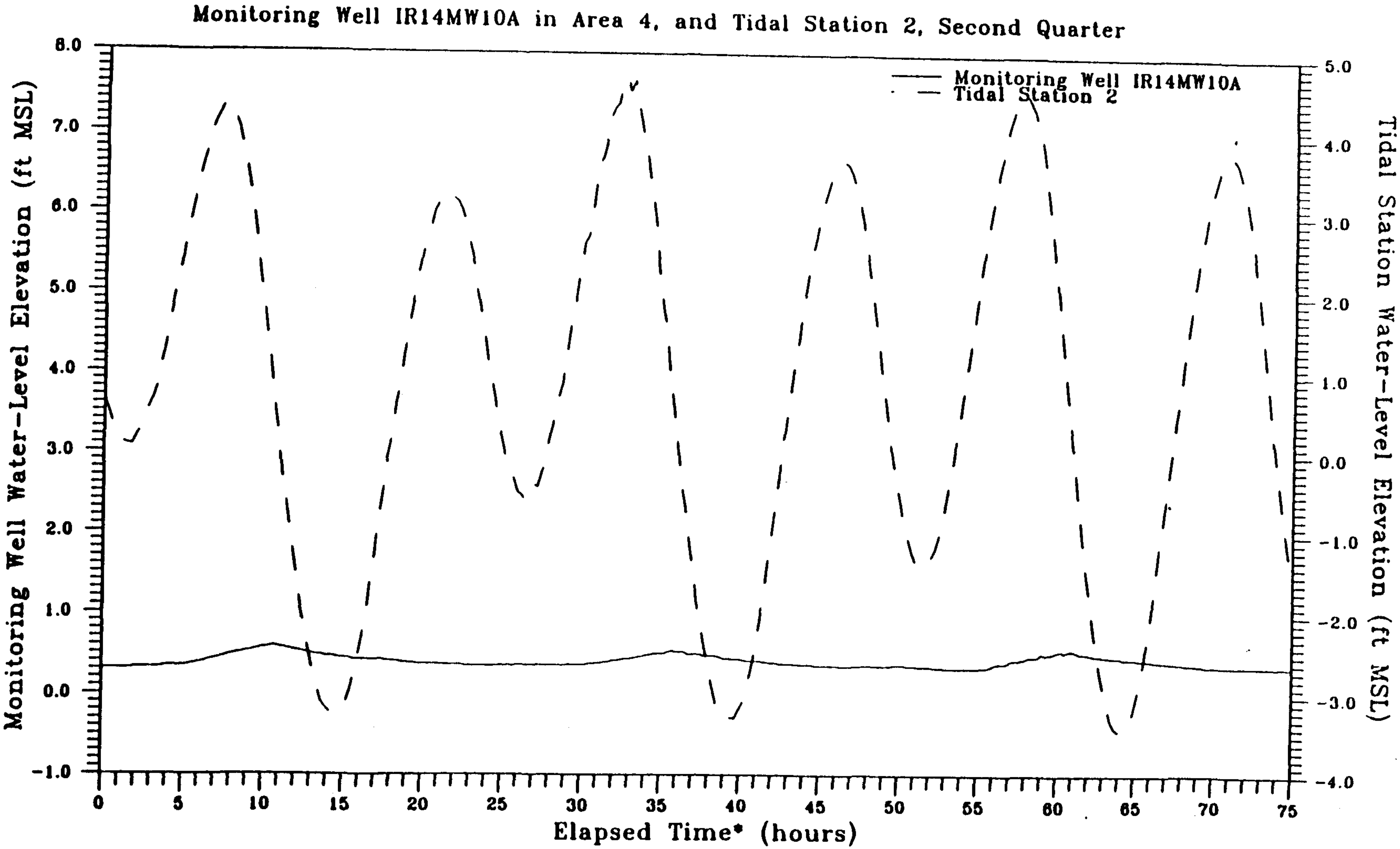


* Monitoring Period began at 03:00am on 02/18/92

DIETERICH-POST 130713

WL CHANGE	0.21	A
TDS	14,000	
SALINITY	11,000	

HYDROGRAPH

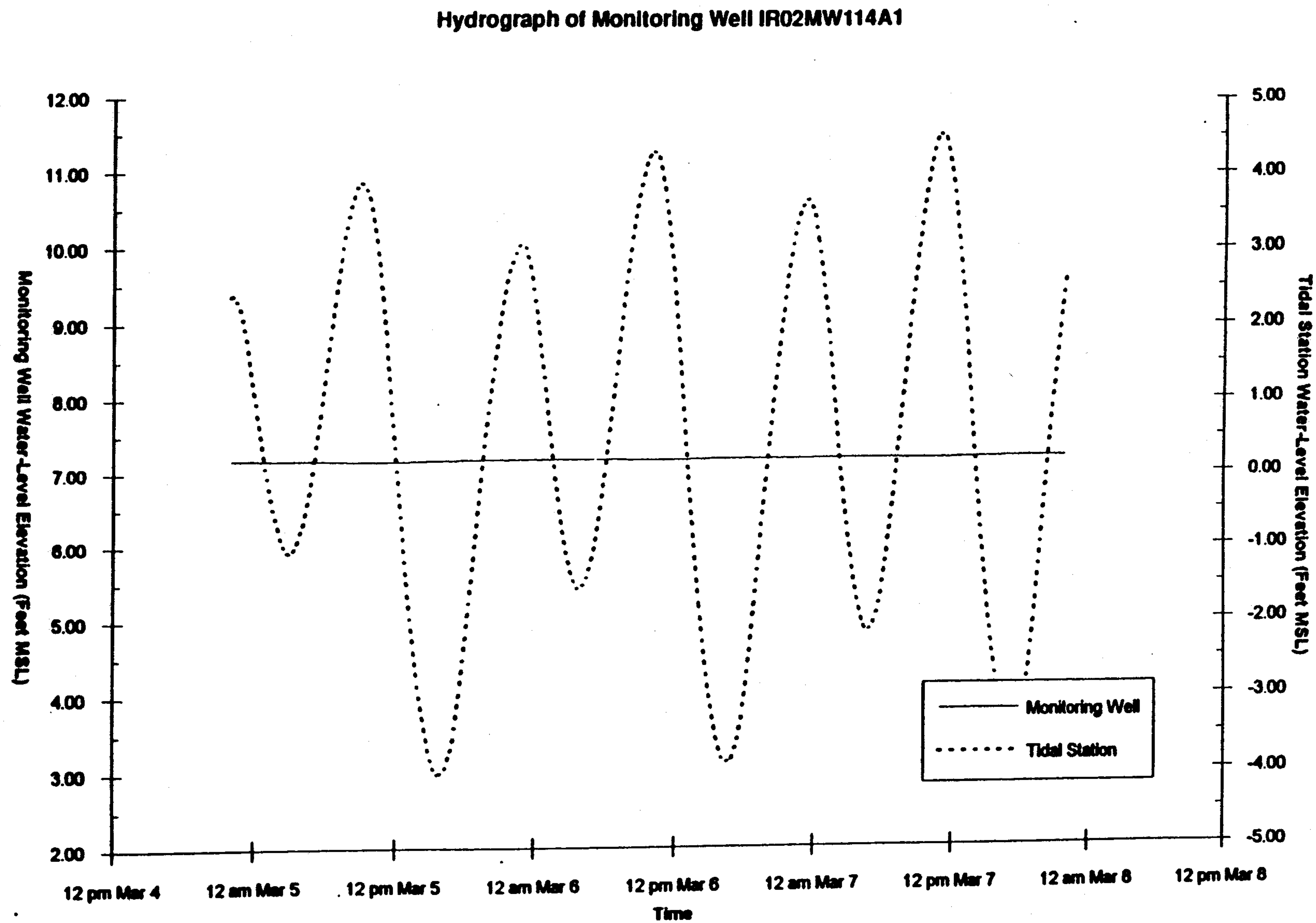


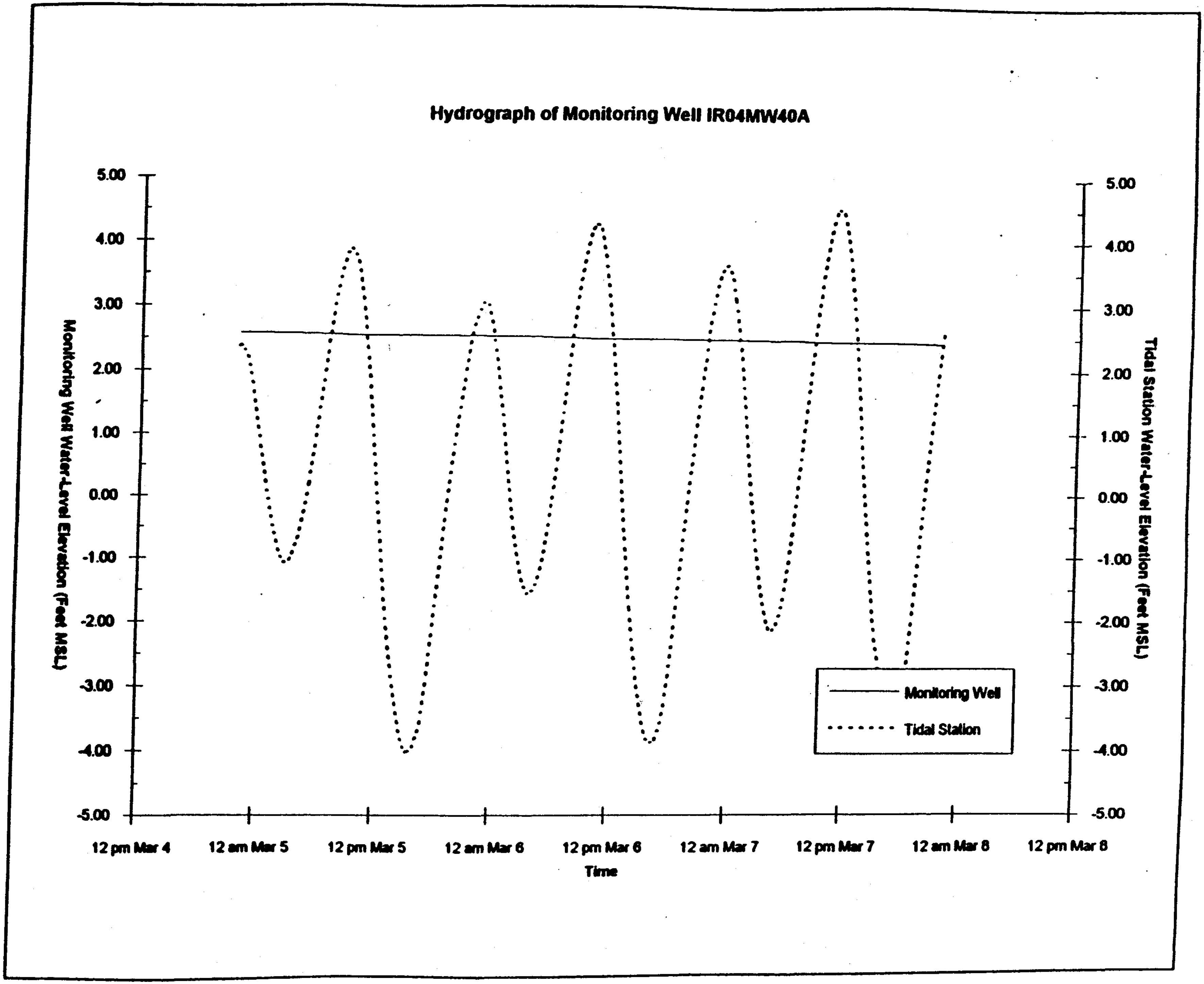
* Monitoring Period began at 00:15am on 03/14/92

DIETERICH-POST 130713

C1-C

HYDROGRAPHS FOR
THIRD ROUND OF TIDAL INFLUENCE MONITORING

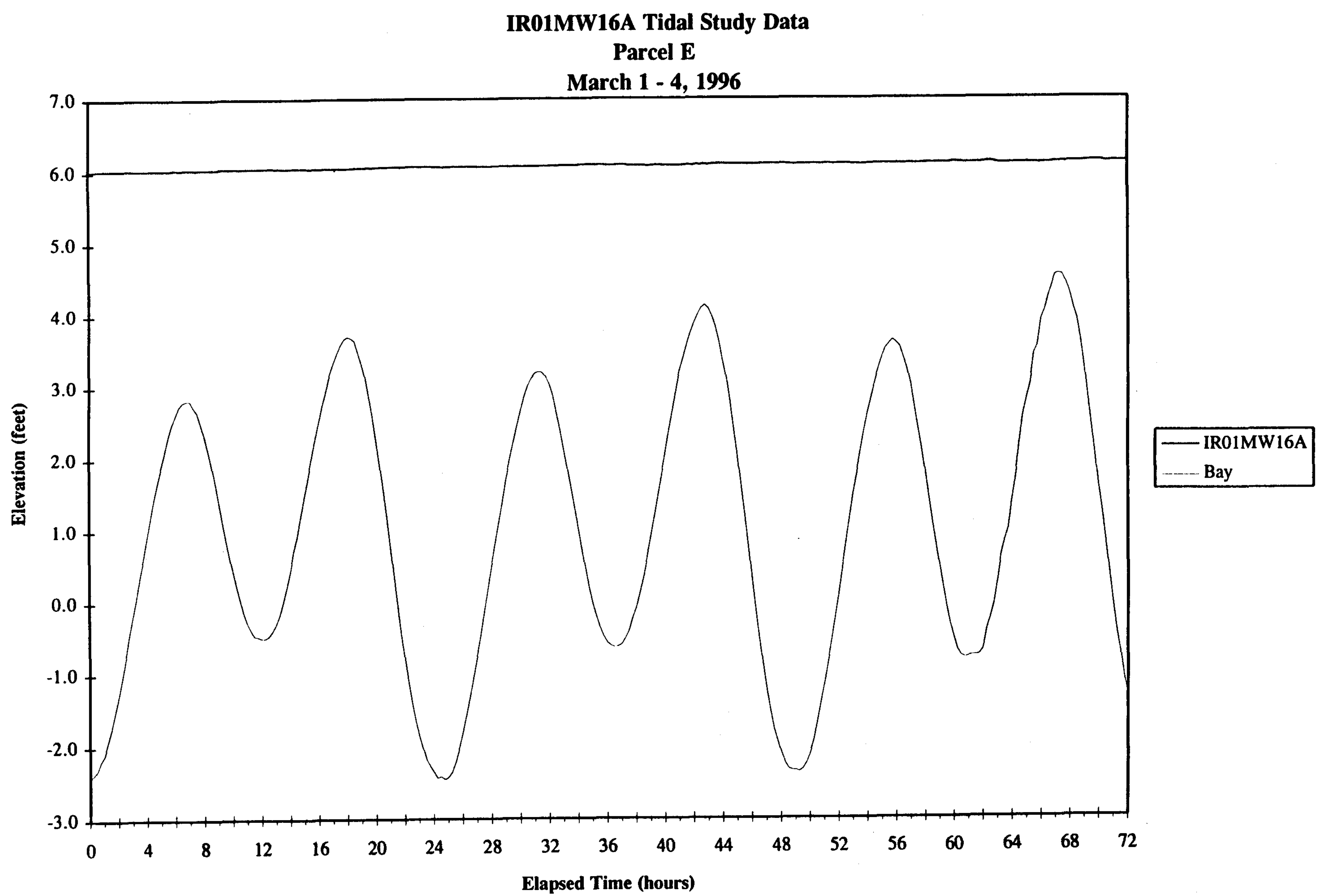

Hydrograph of Monitoring Well IR02MW114A1
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
Monitoring Well Water-Level Elevation (Feet MSL)
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
Tidal Station Water-Level Elevation (Feet MSL)
Monitoring Well
Tidal Station
12 pm Mar 4
12 am Mar 5
12 pm Mar 5
12 am Mar 6
12 pm Mar 6
12 am Mar 7
12 pm Mar 7
12 am Mar 8
12 pm Mar 8
Time

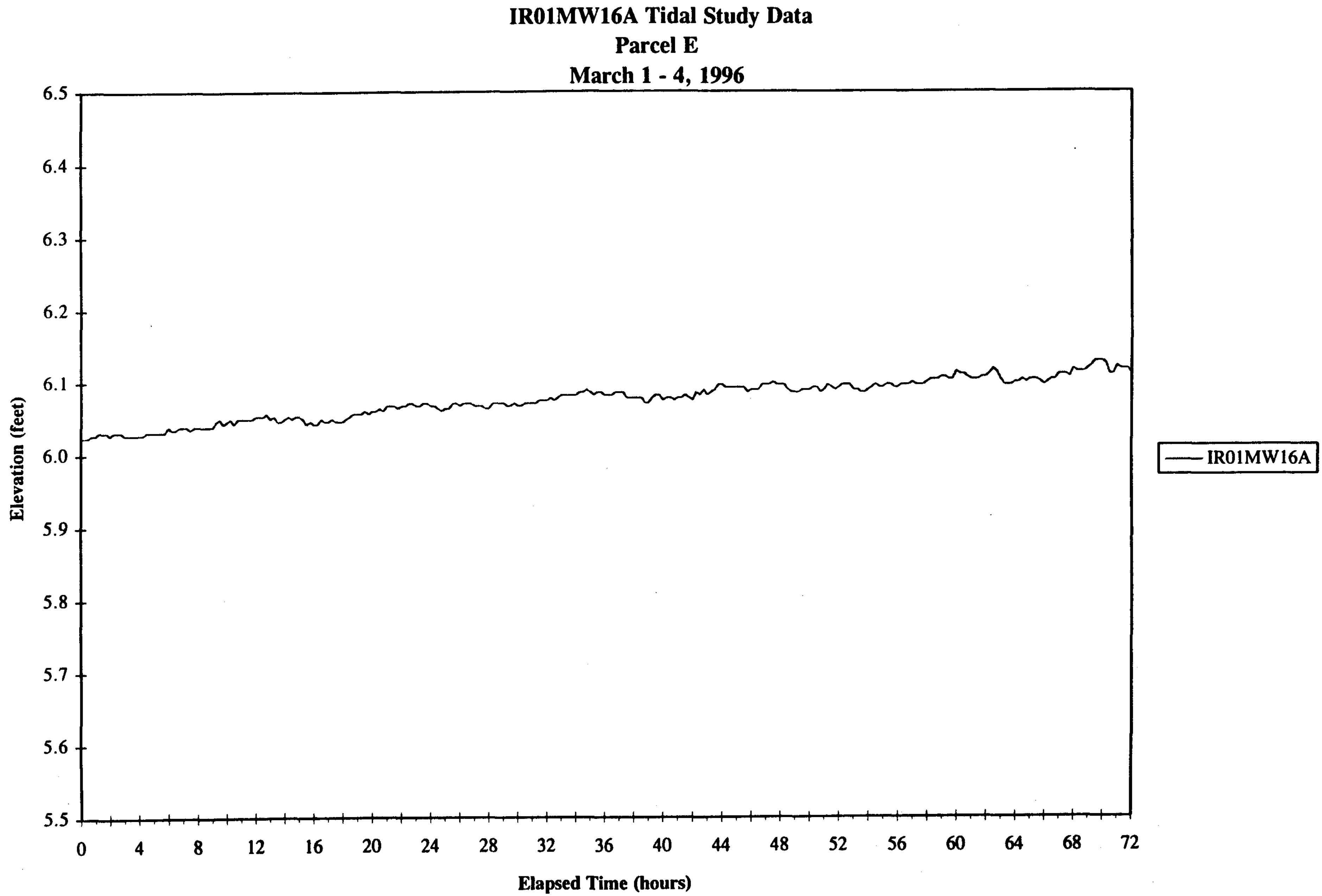


Hydrograph of Monitoring Well IR04MW40A
Monitoring Well Water-Level Elevation (Feet MSL)
Tidal Station Water-Level Elevation (Feet MSL)
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
12 pm Mar 4
12 am Mar 5
12 pm Mar 5
12 am Mar 6
12 pm Mar 6
12 am Mar 7
12 pm Mar 7
12 am Mar 8
12 pm Mar 8
Time
Monitoring Well
Tidal Station

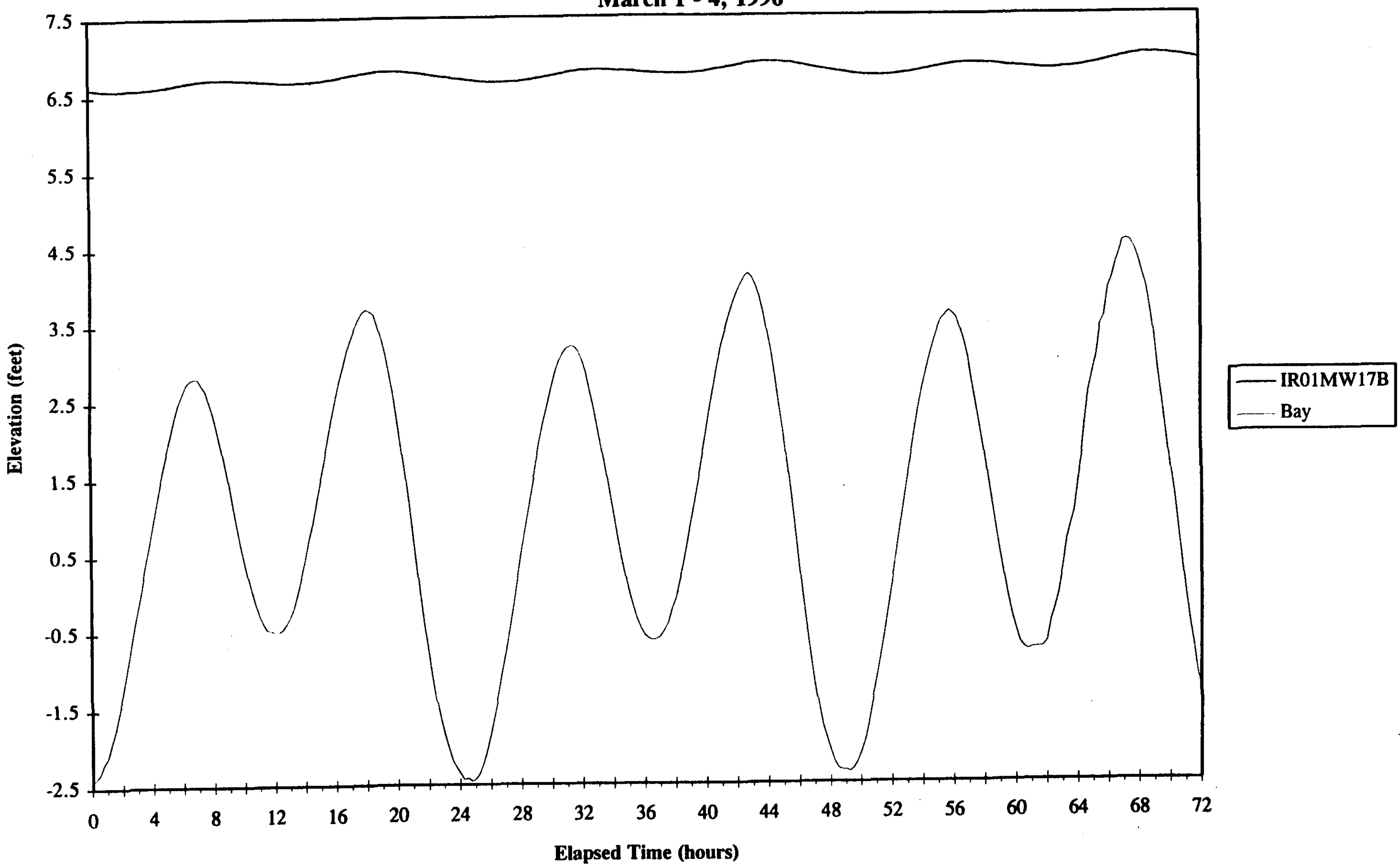
C1-D

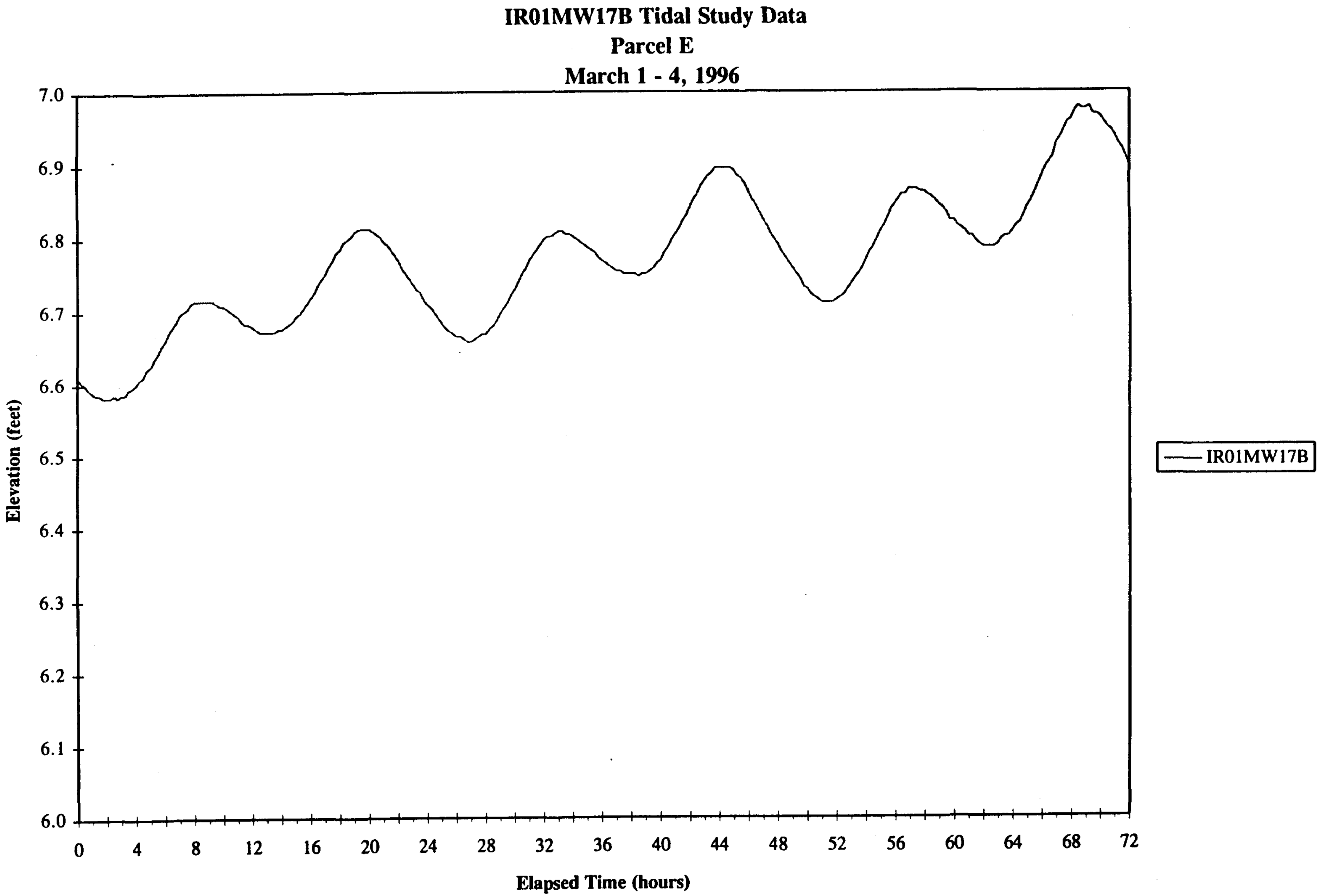
HYDROGRAPHS FOR
FOURTH ROUND OF TIDAL INFLUENCE MONITORING


IR01MW16A Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MW16A
Bay


IR01MW16A Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
6.5
6.4
6.3
6.2
6.1
6.0
5.9
5.8
5.7
5.6
5.5
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MW16A

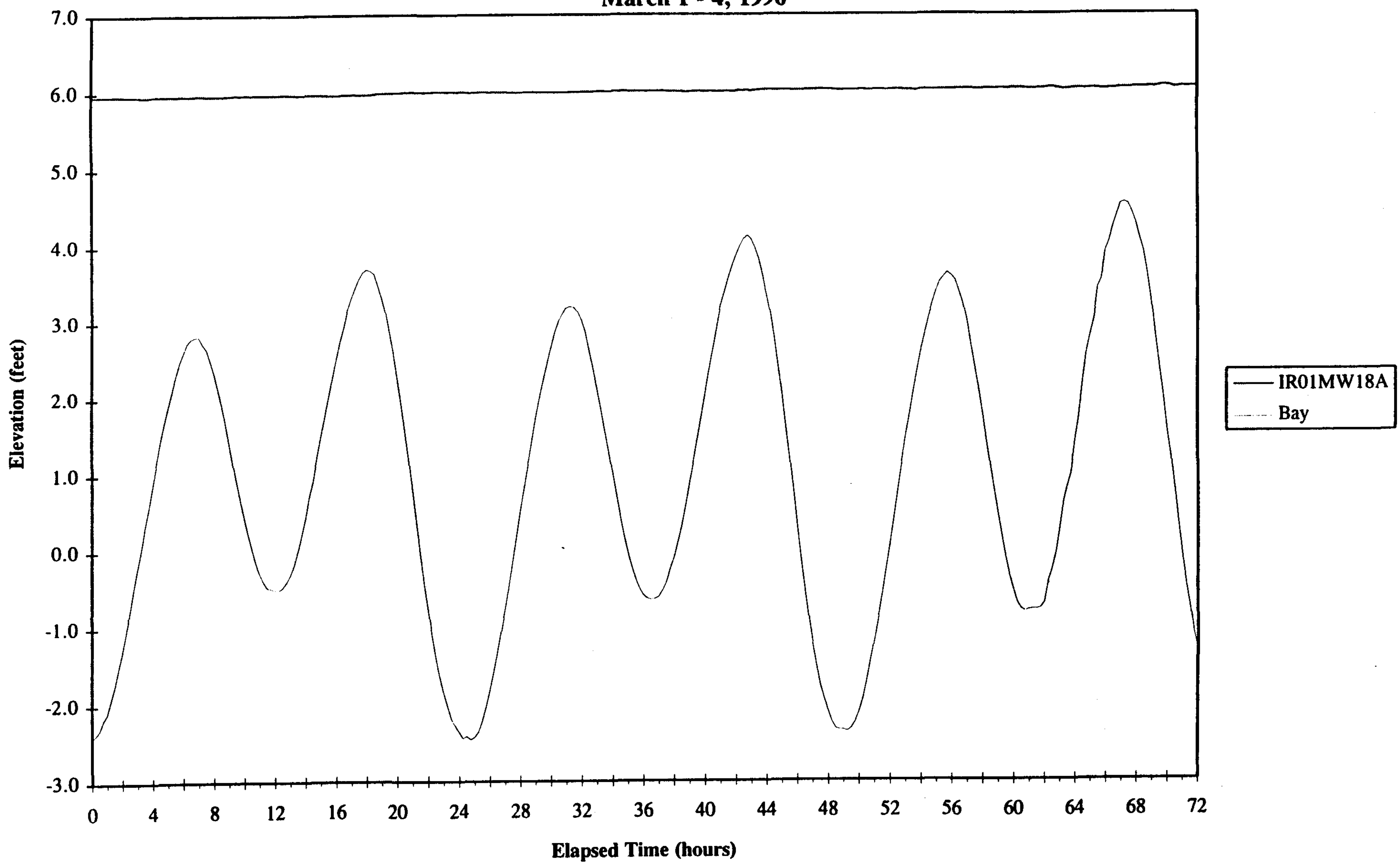
IR01MW17B Tidal Study Data
Parcel E
March 1 - 4, 1996



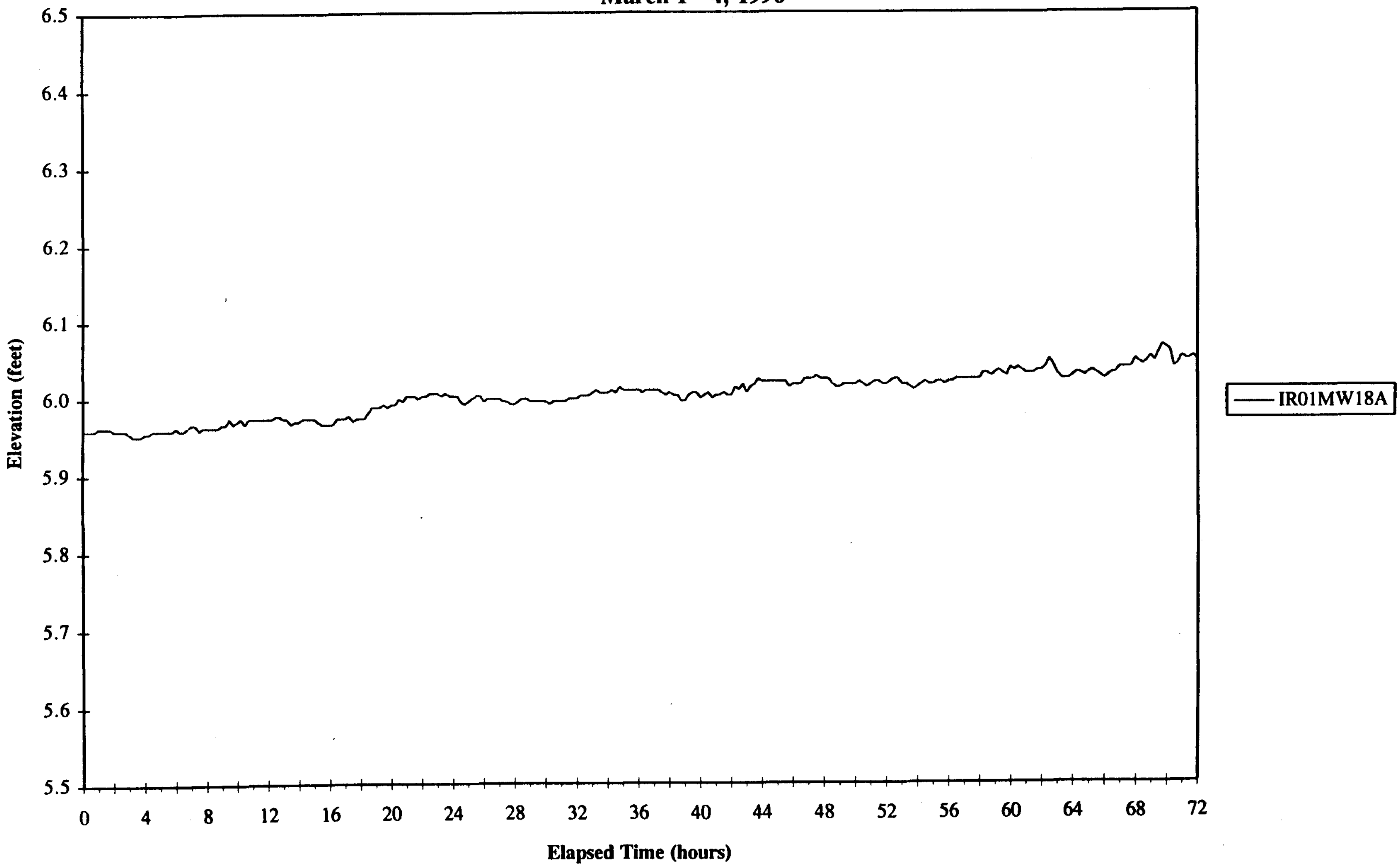


IR01MW17B Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
7.0
6.9
6.8
6.7
6.6
6.5
6.4
6.3
6.2
6.1
6.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MW17B

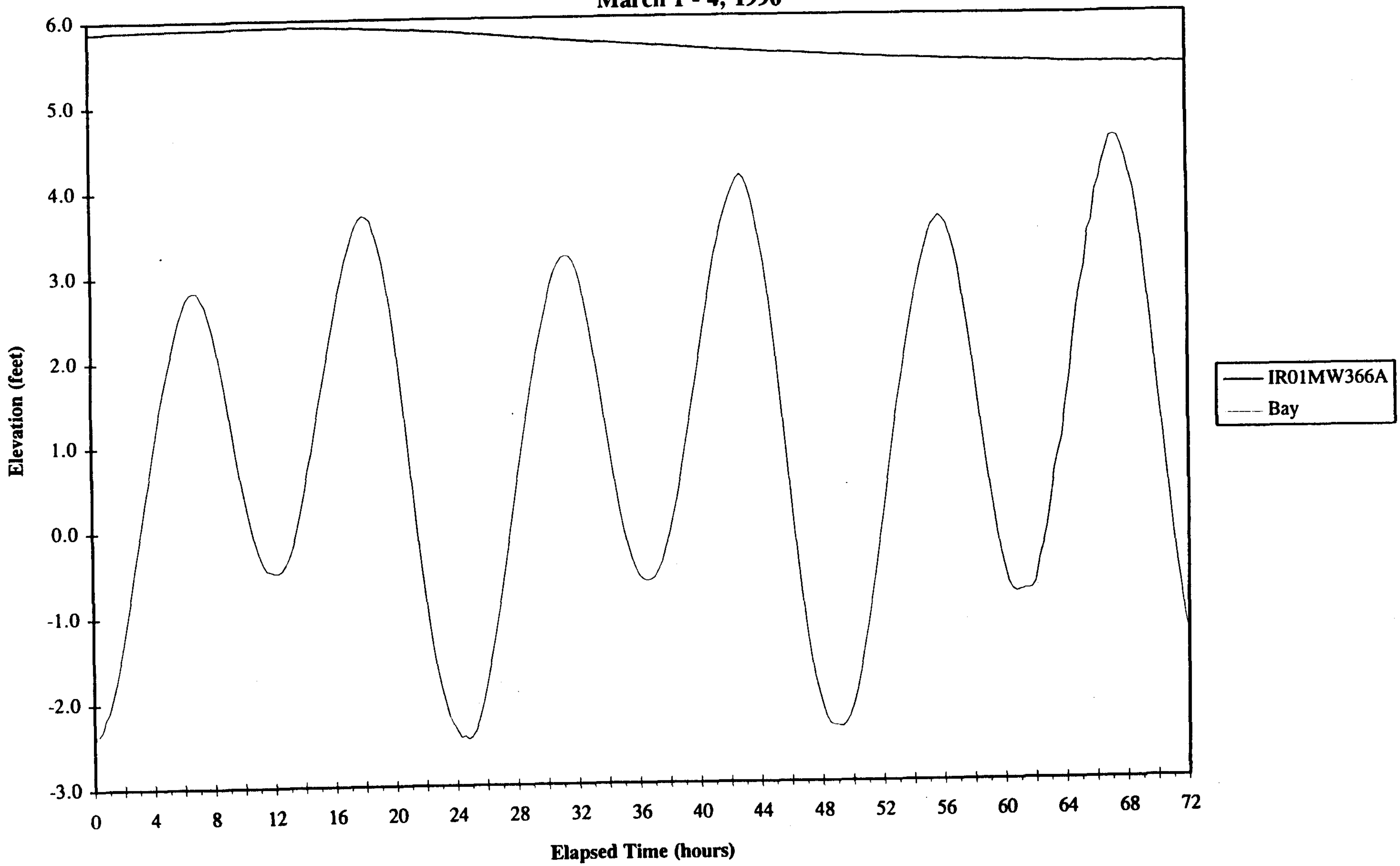
IR01MW18A Tidal Study Data
Parcel E
March 1 - 4, 1996

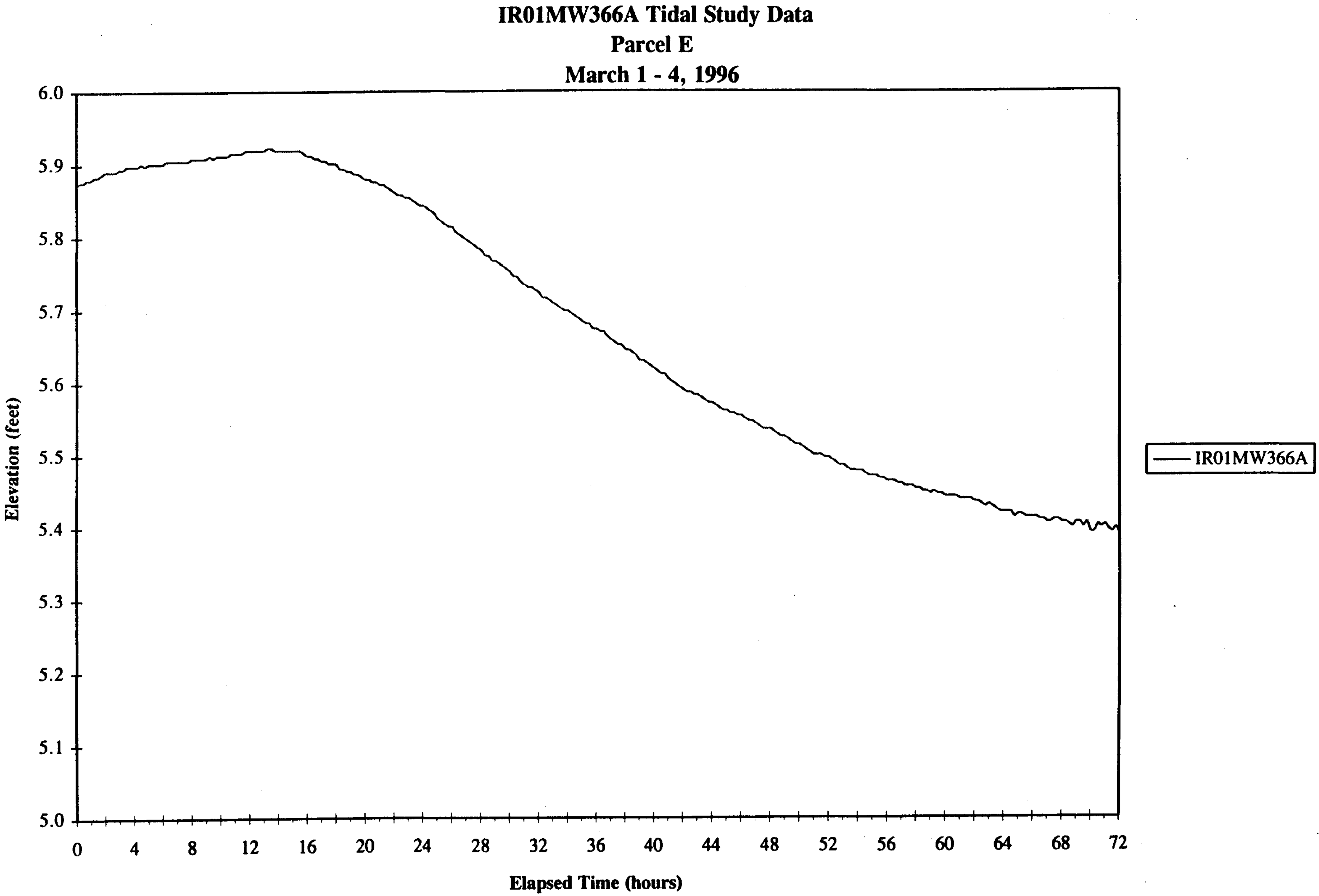


IR01MW18A Tidal Study Data
Parcel E
March 1 - 4, 1996

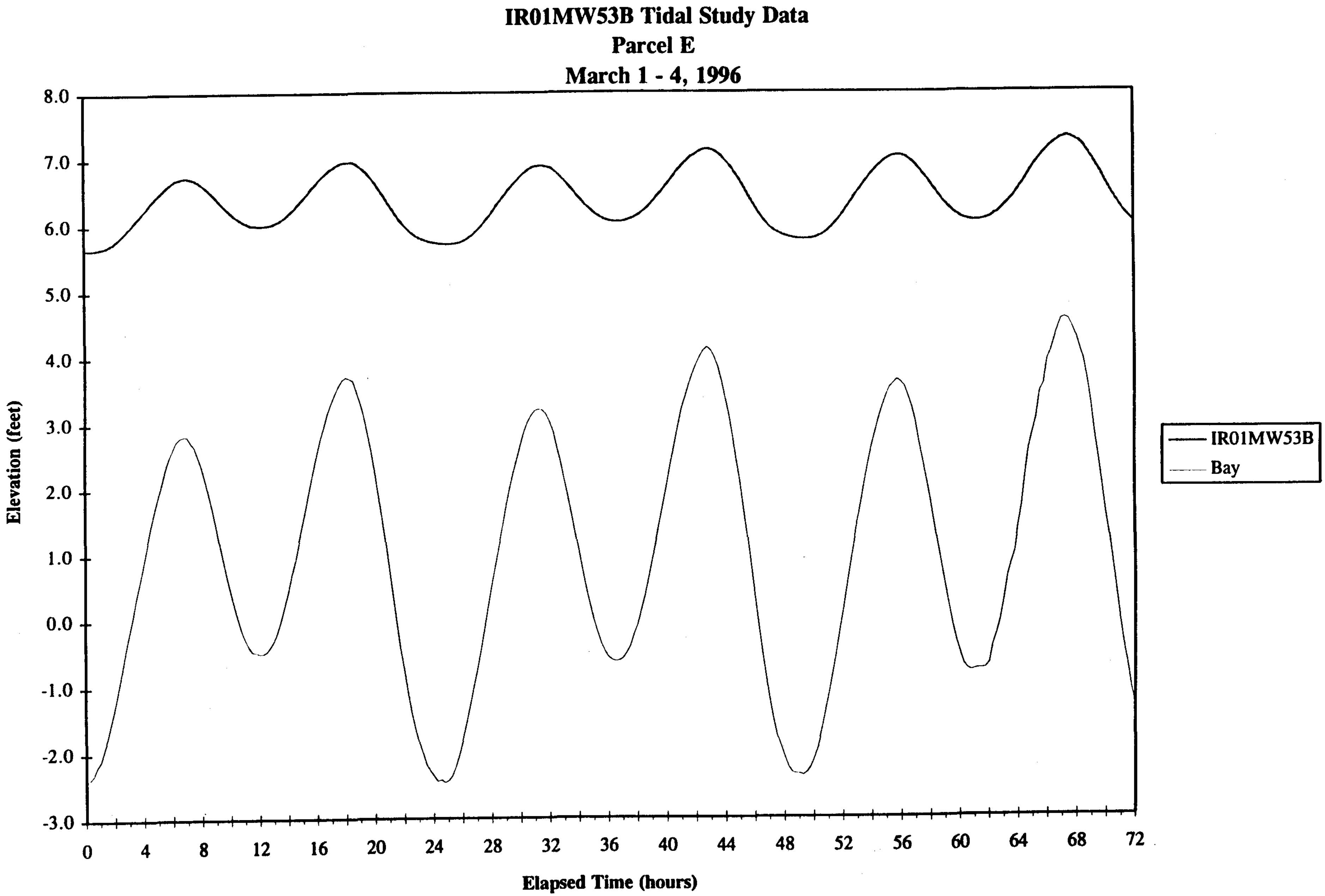


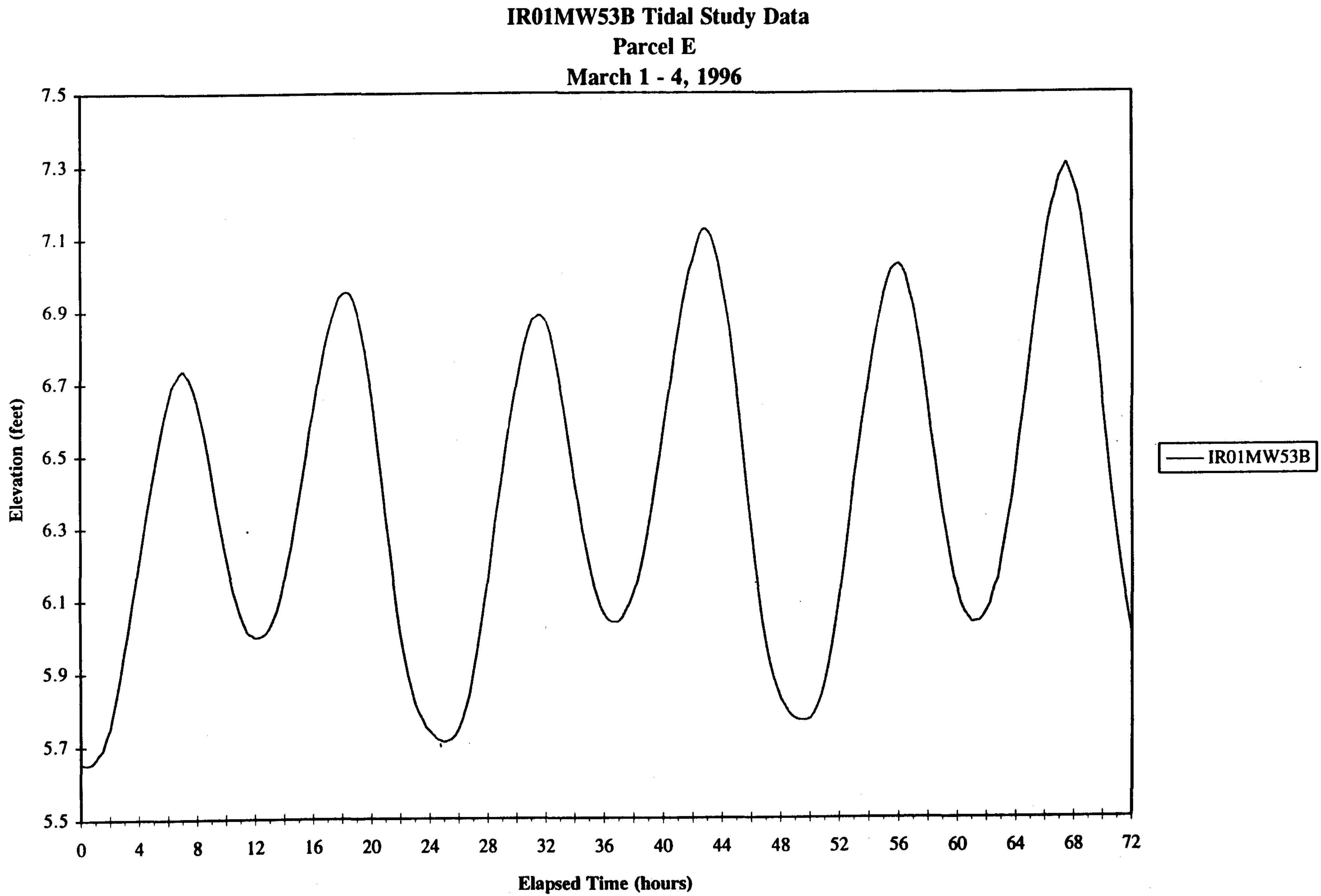
IR01MW366A Tidal Study Data
Parcel E
March 1 - 4, 1996



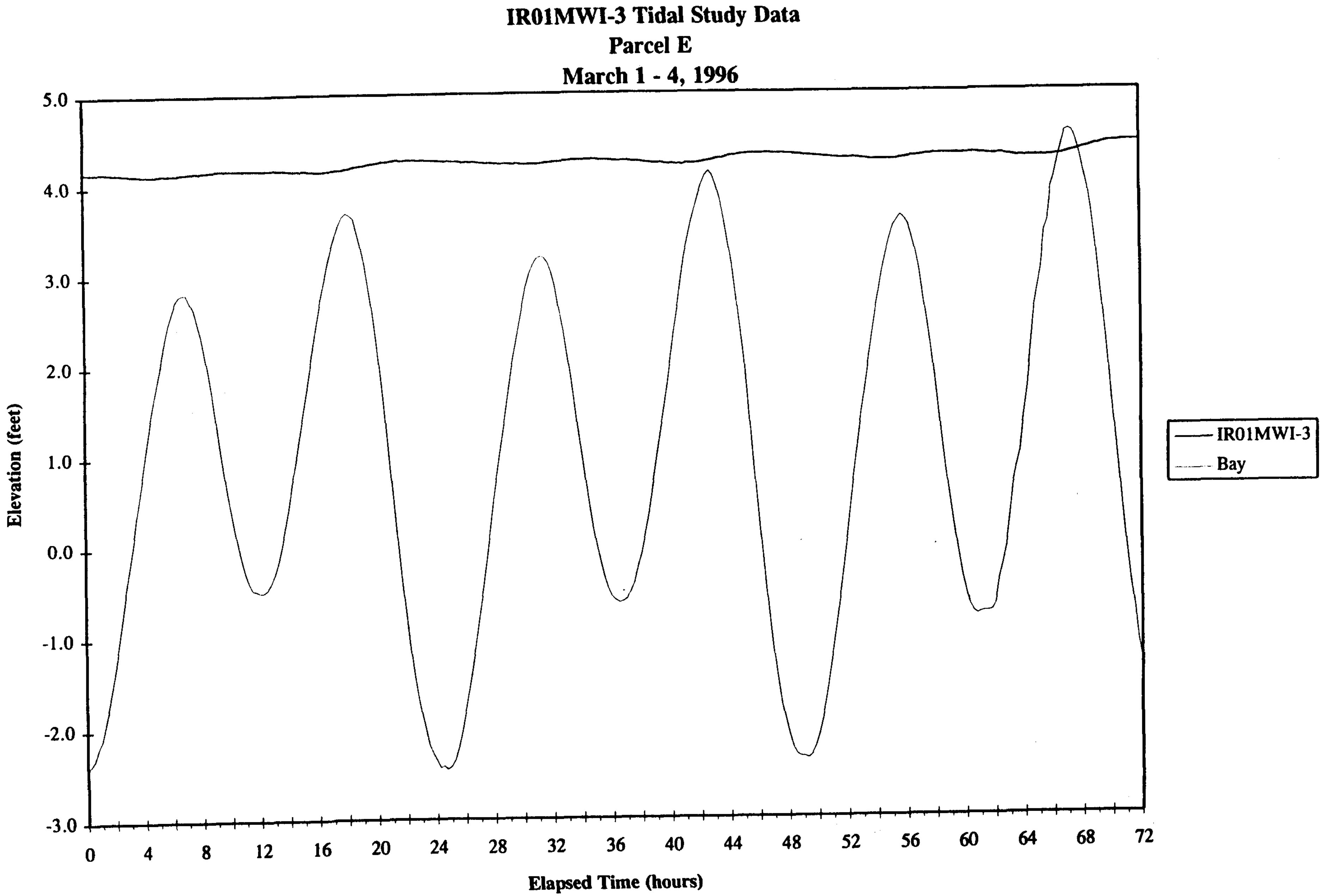


IR01MW366A Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
6.0
5.9
5.8
5.7
5.6
5.5
5.4
5.3
5.2
5.1
5.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MW366A

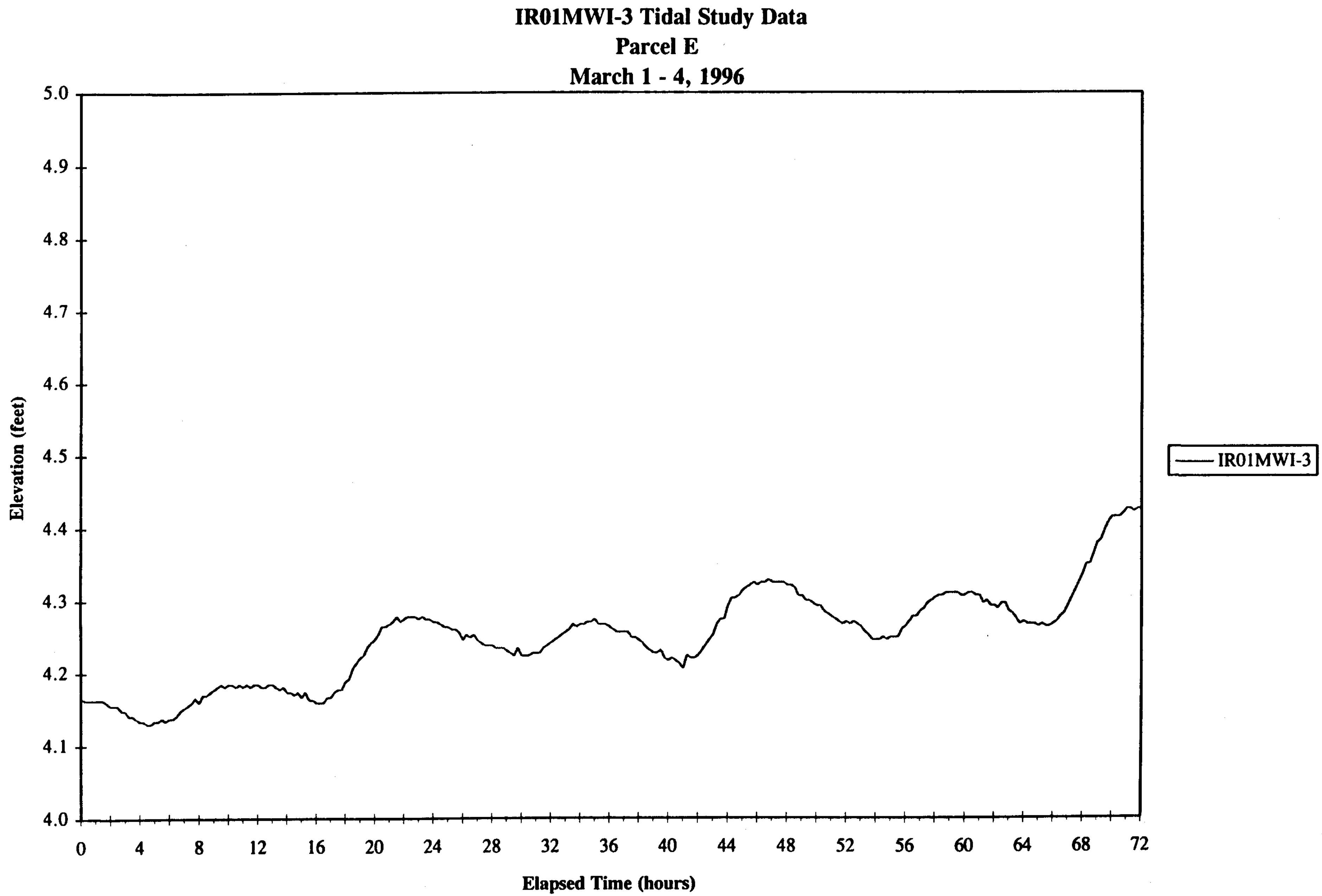

IR01MW53B Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MW53B
Bay

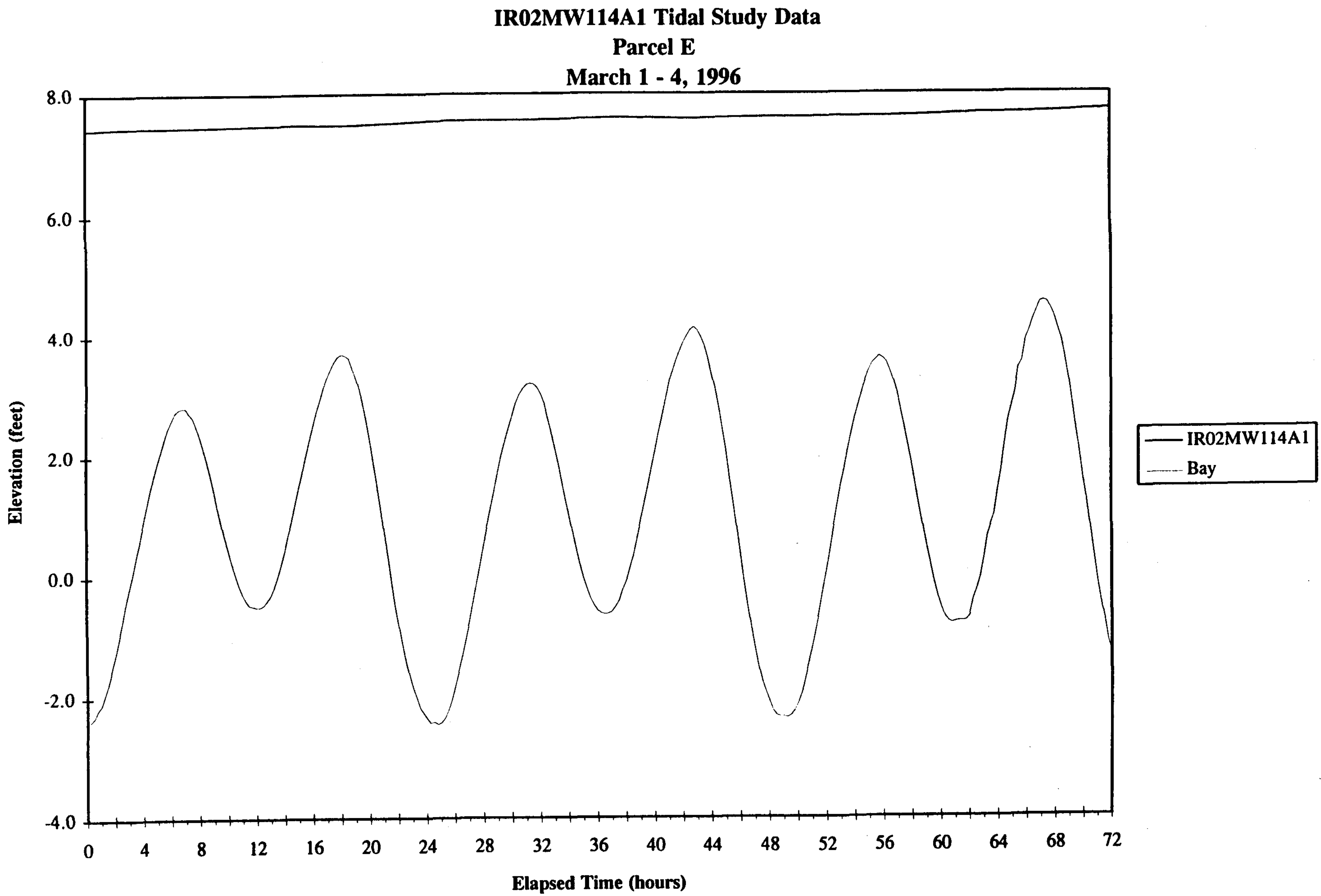


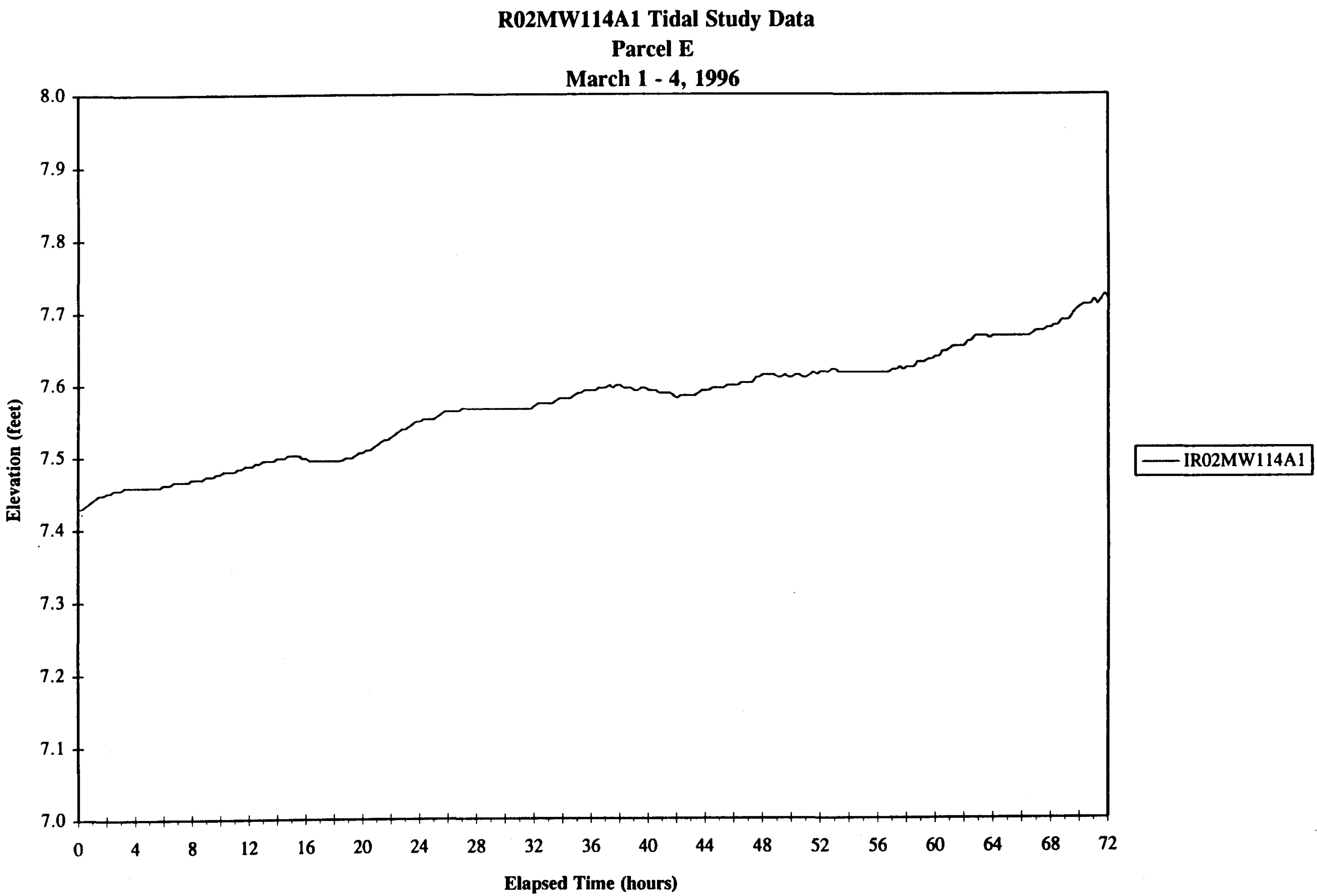
IR01MW53B Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
7.5
7.3
7.1
6.9
6.7
6.5
6.3
6.1
5.9
5.7
5.5
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MW53B

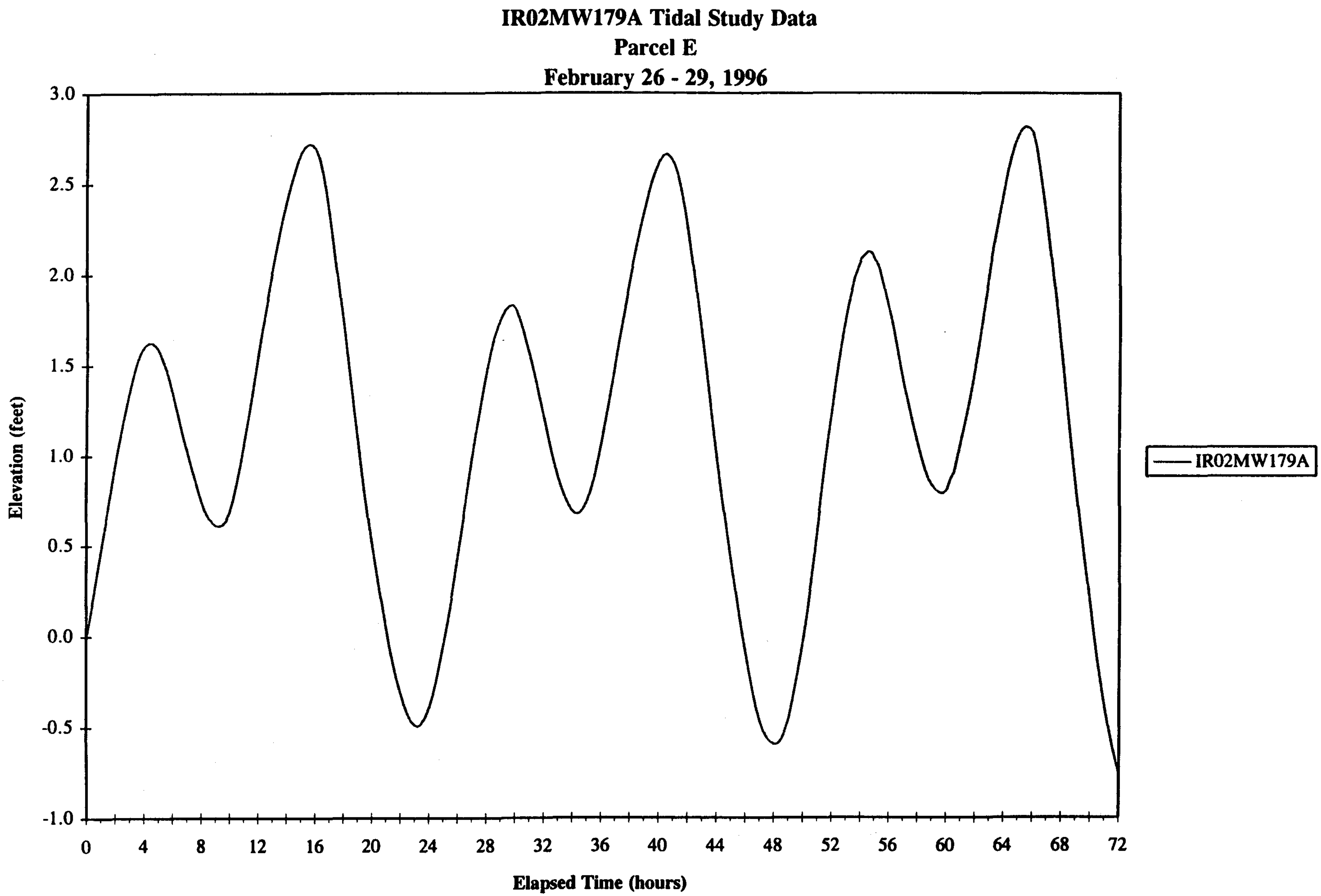


IR01MWI-3 Tidal Study Data
Parcel E
March 1 - 4, 1996
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MWI-3
Bay


IR01MWI-3 Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
5.0
4.9
4.8
4.7
4.6
4.5
4.4
4.3
4.2
4.1
4.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR01MWI-3

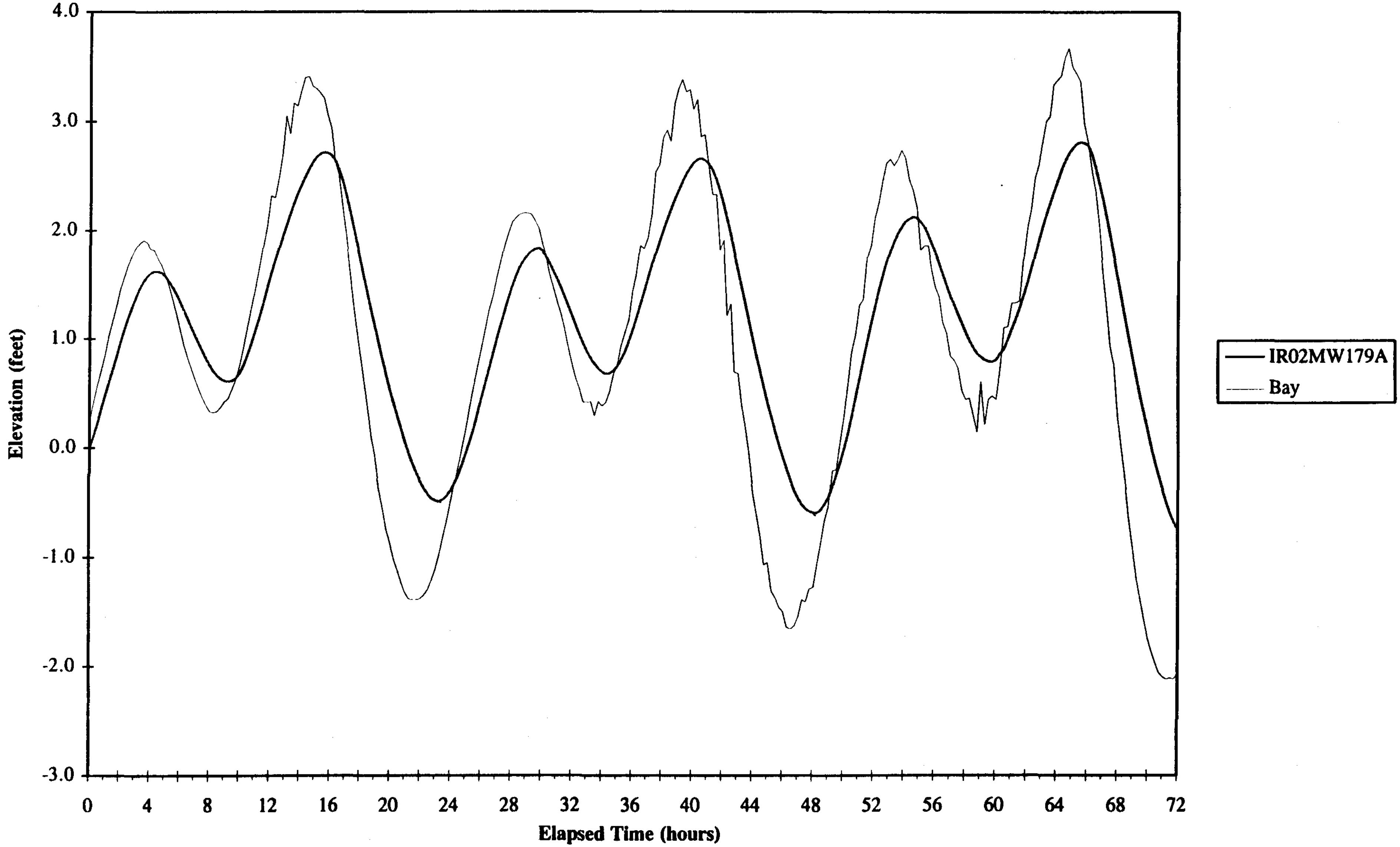

IR02MW114A1 Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR02MW114A1
Bay


R02MW114A1 Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
8.0
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR02MW114A1

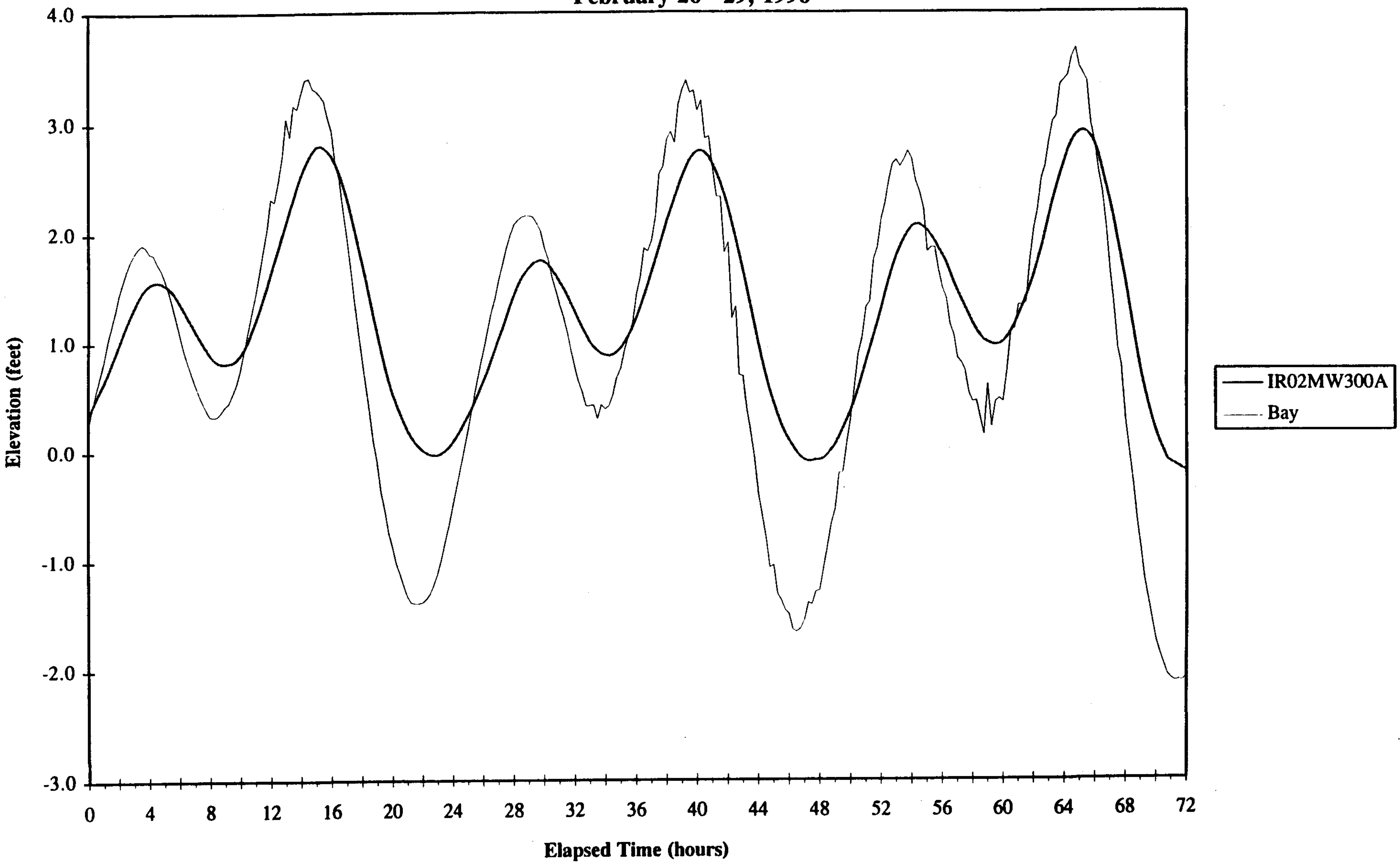


IR02MW179A Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR02MW179A

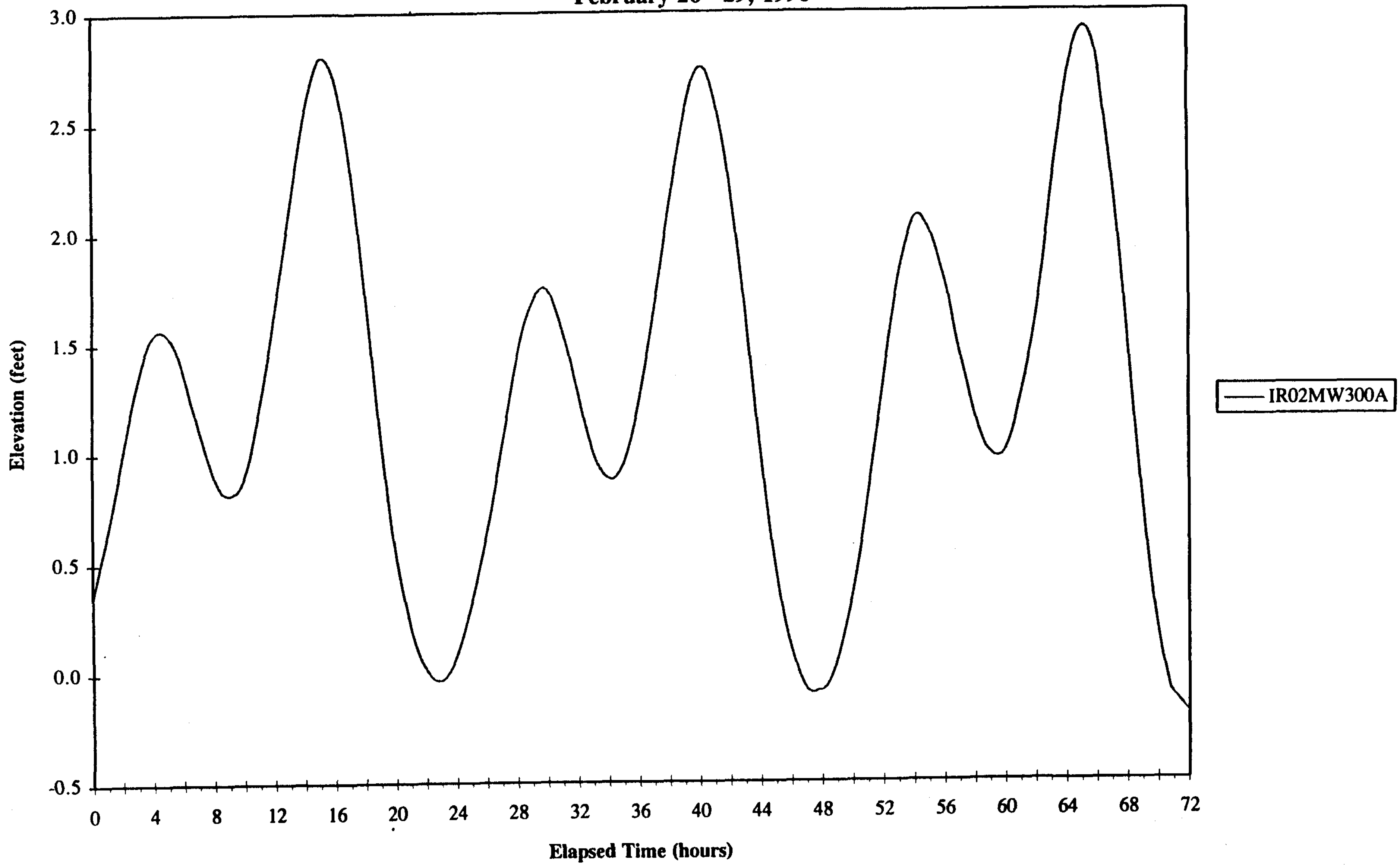
IR02MW179A Tidal Study Data
Parcel E
February 26 -29, 1996



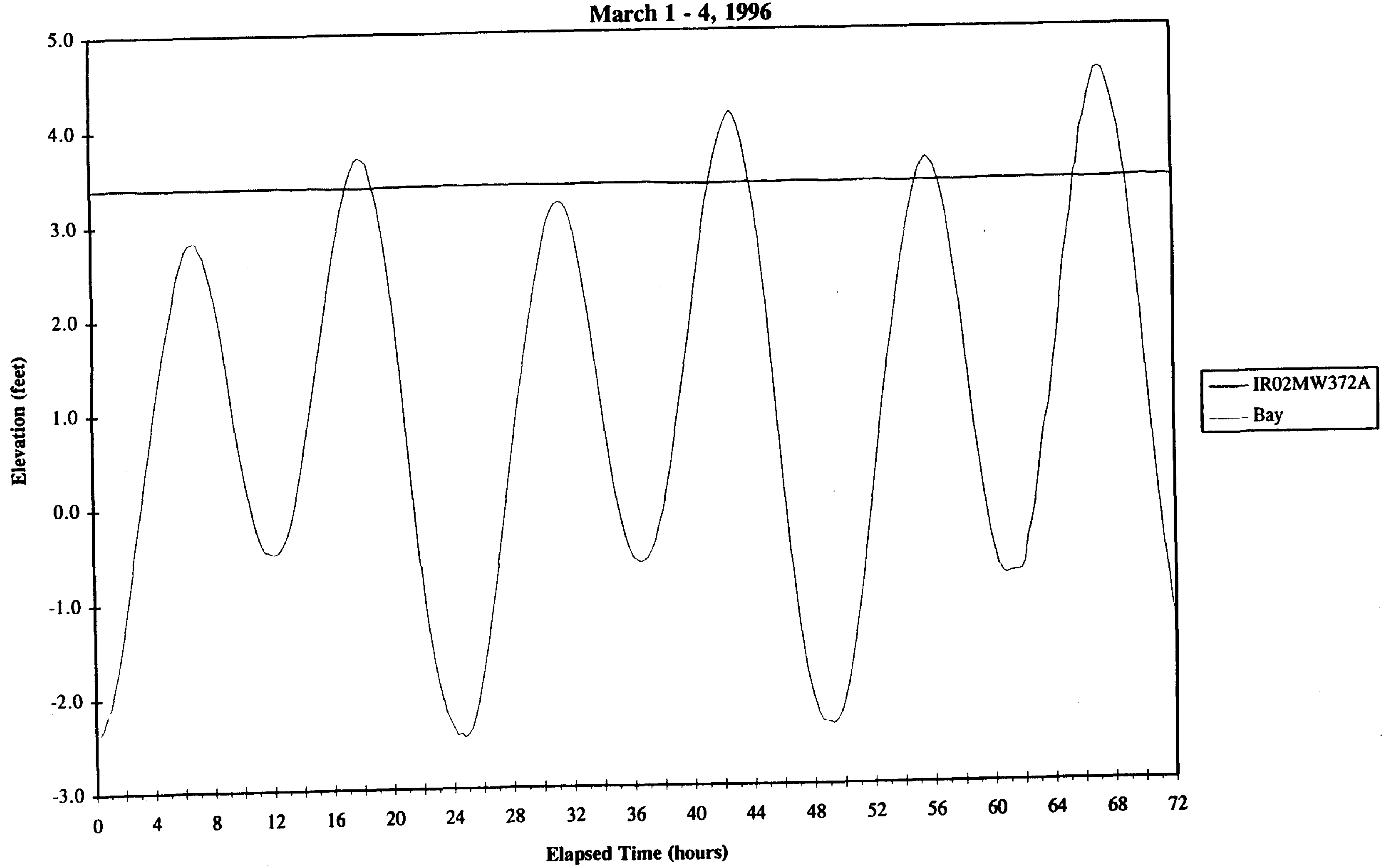
IR02MW300A Tidal Study Data
Parcel E
February 26 - 29, 1996



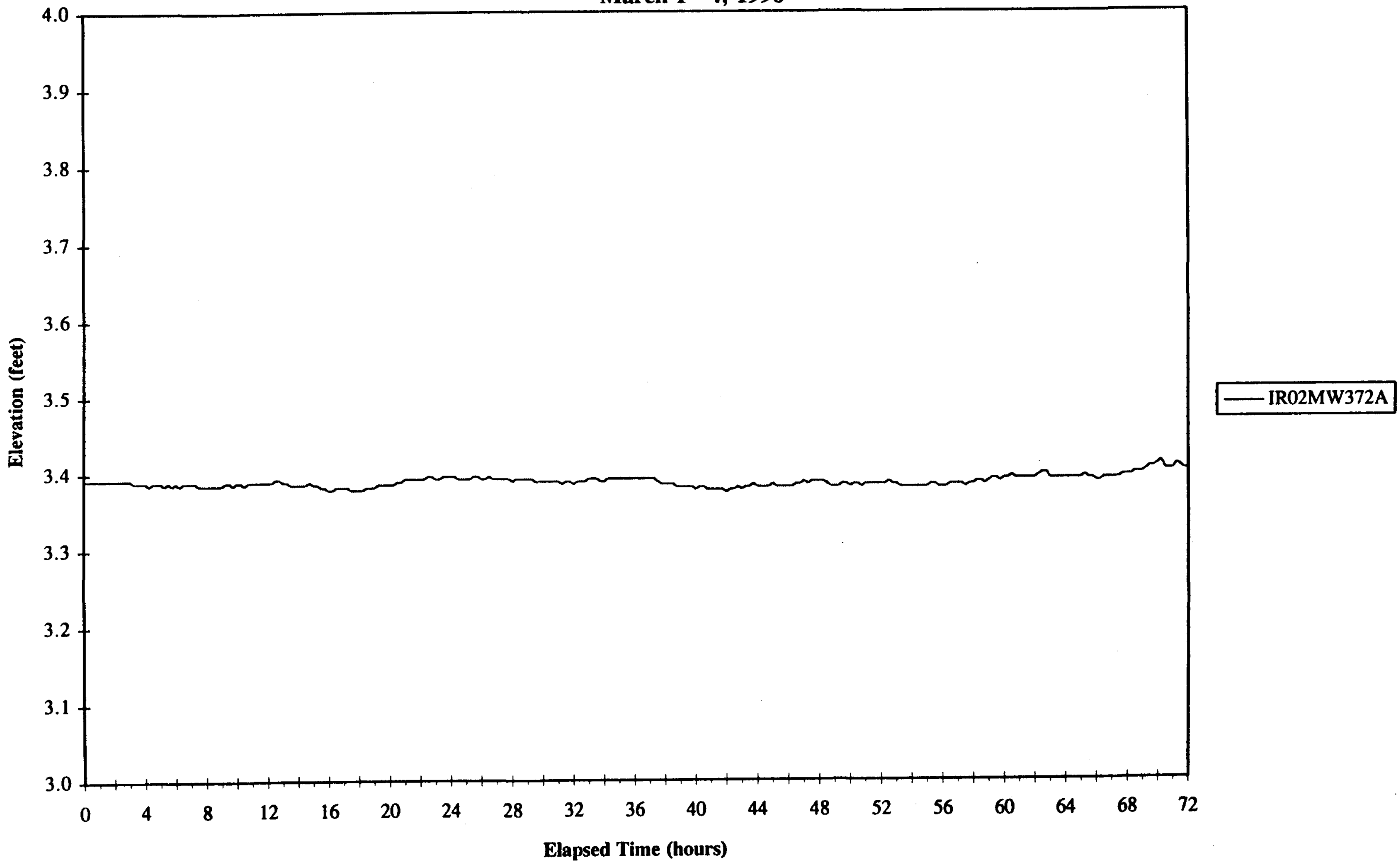
IR02MW300A Tidal Study Data
Parcel E
February 26 - 29, 1996

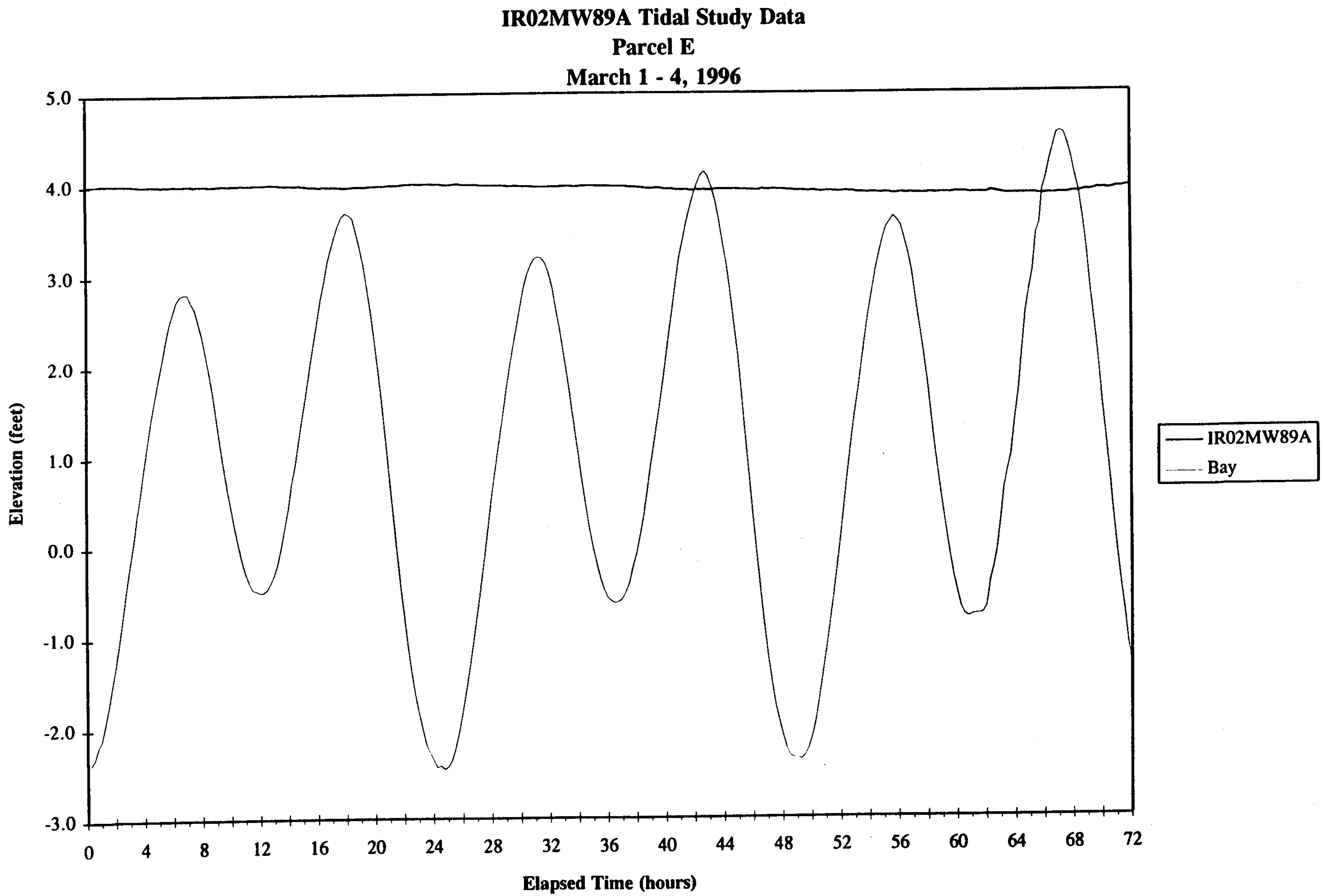


IR02MW372A Tidal Study Data
Parcel E
March 1 - 4, 1996

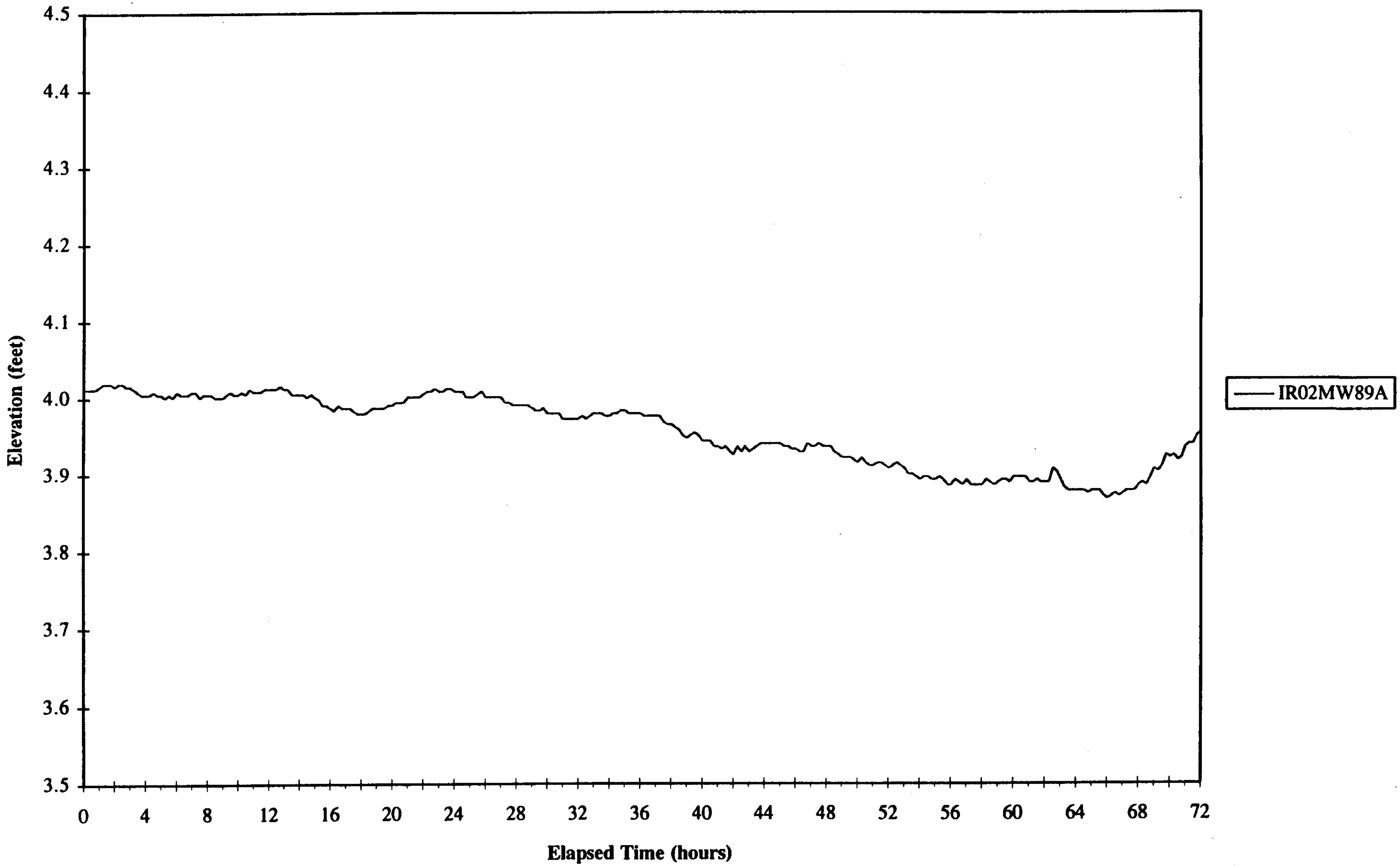


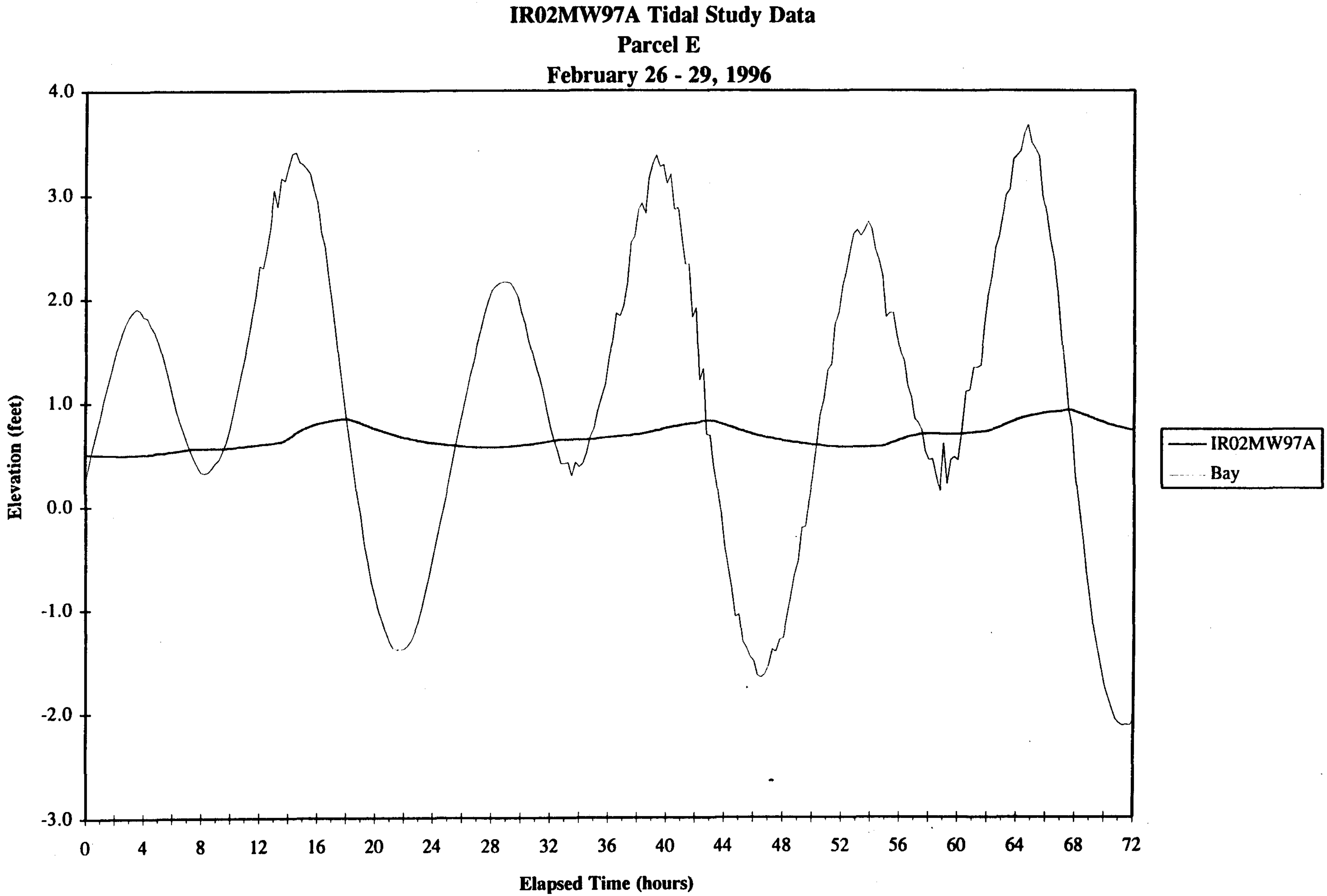
IR02MW372A Tidal Study Data
Parcel E
March 1 - 4, 1996

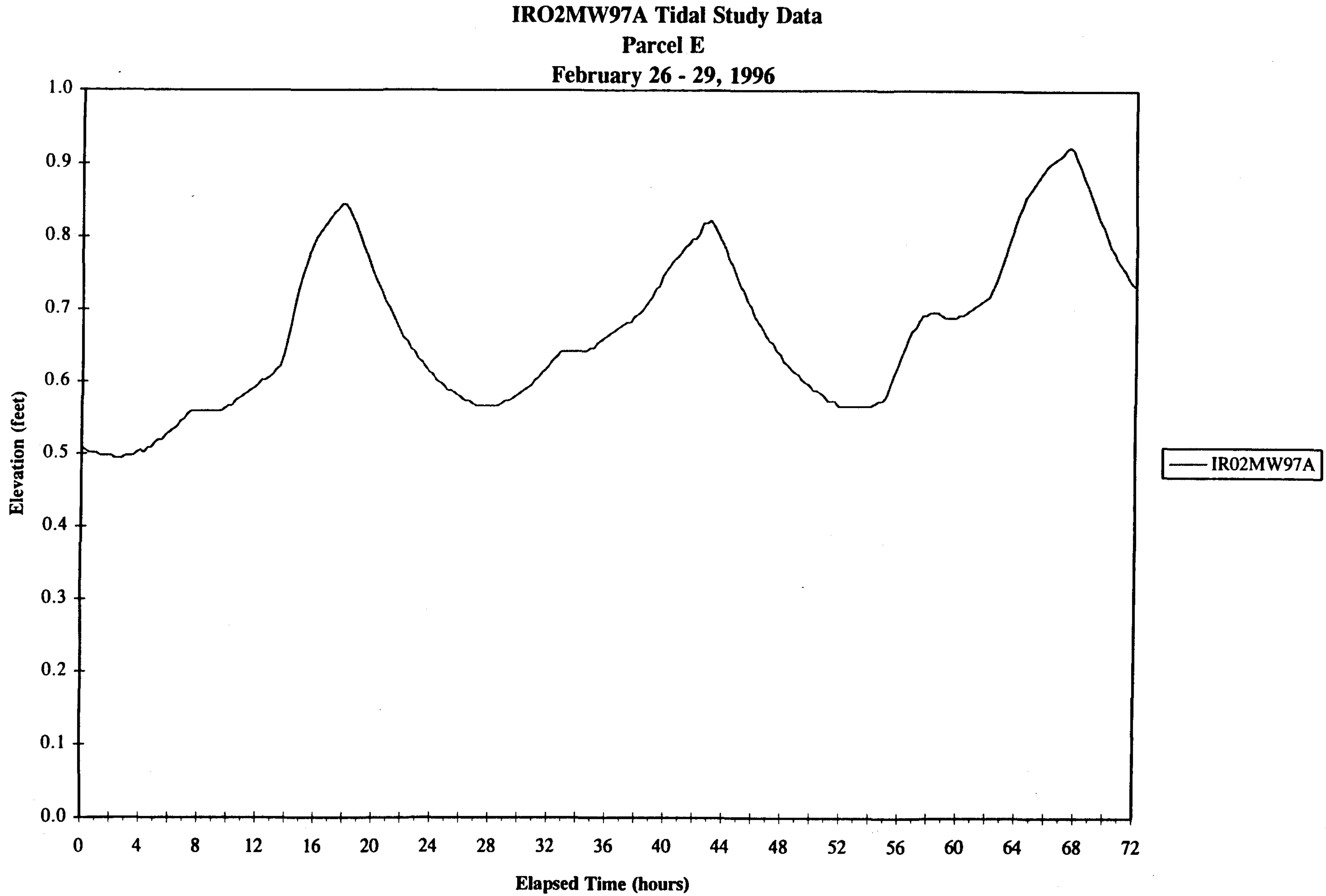



IR02MW89A Tidal Study Data
Parcel E
March 1 - 4, 1996
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR02MW89A
Bay

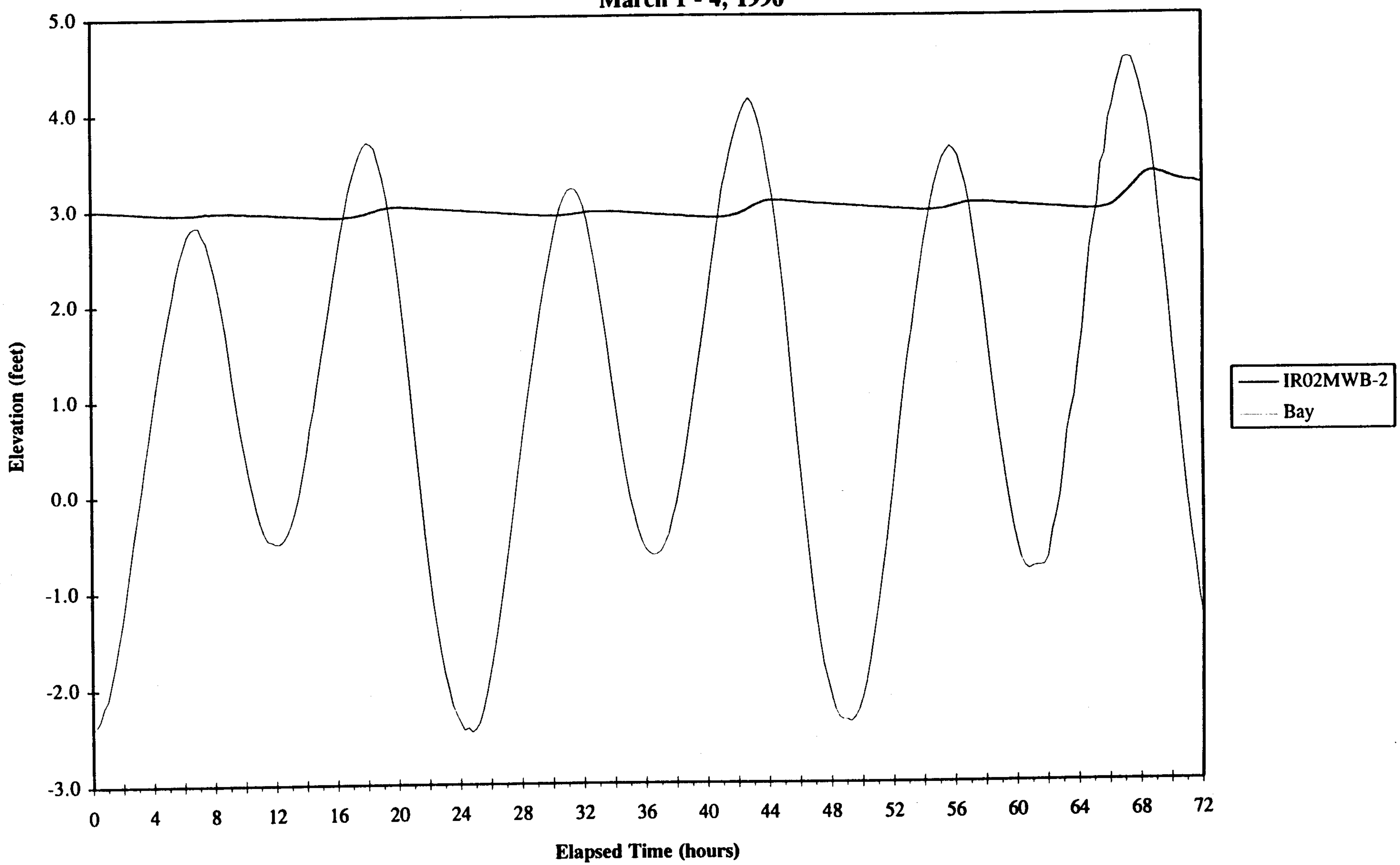
IR02MW89A Tidal Study Data
Parcel E
March 1 - 4, 1996

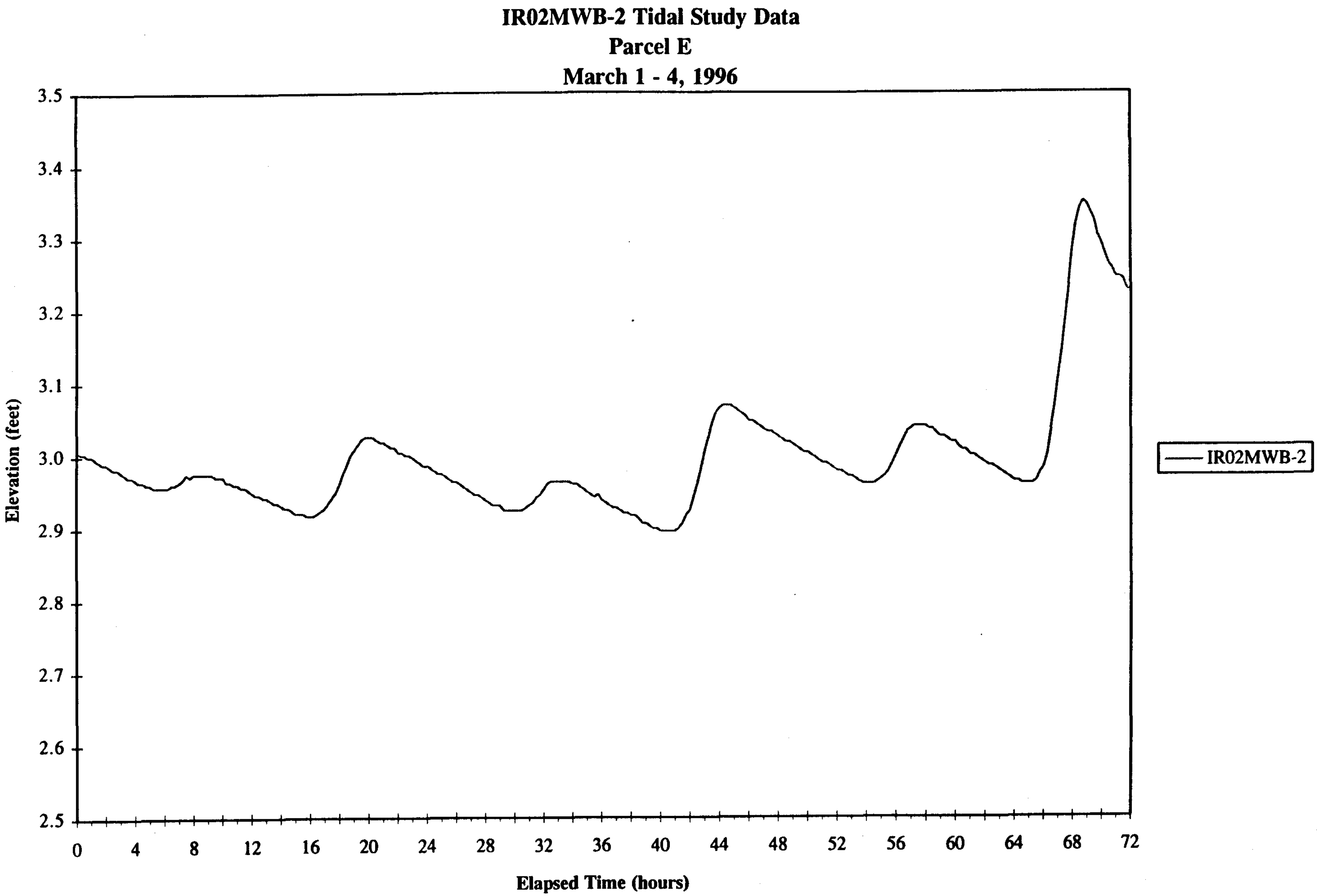



IR02MW97A Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR02MW97A
Bay

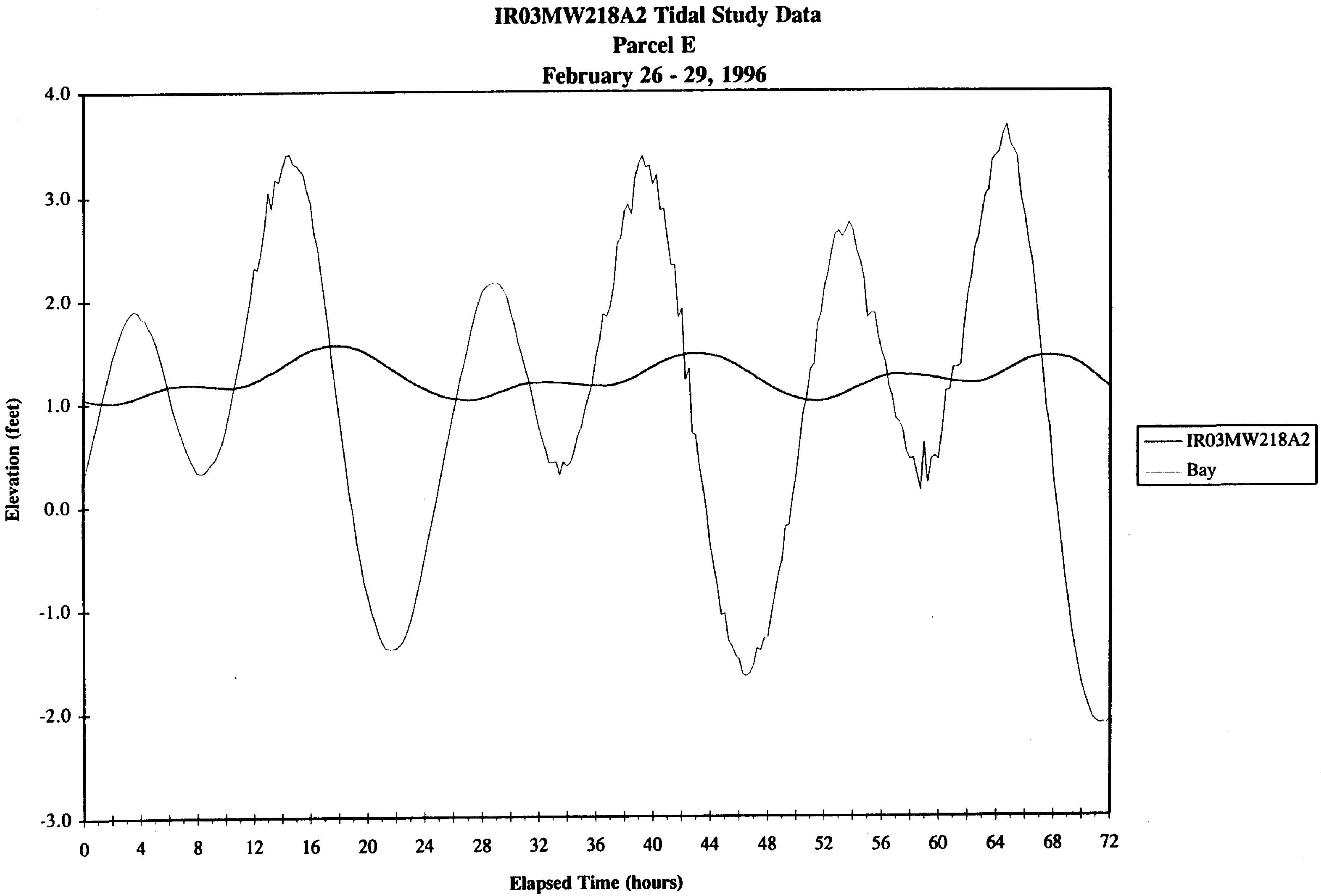

IRO2MW97A Tidal Study Data
Parcel E
February 26 - 29, 1996
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR02MW97A

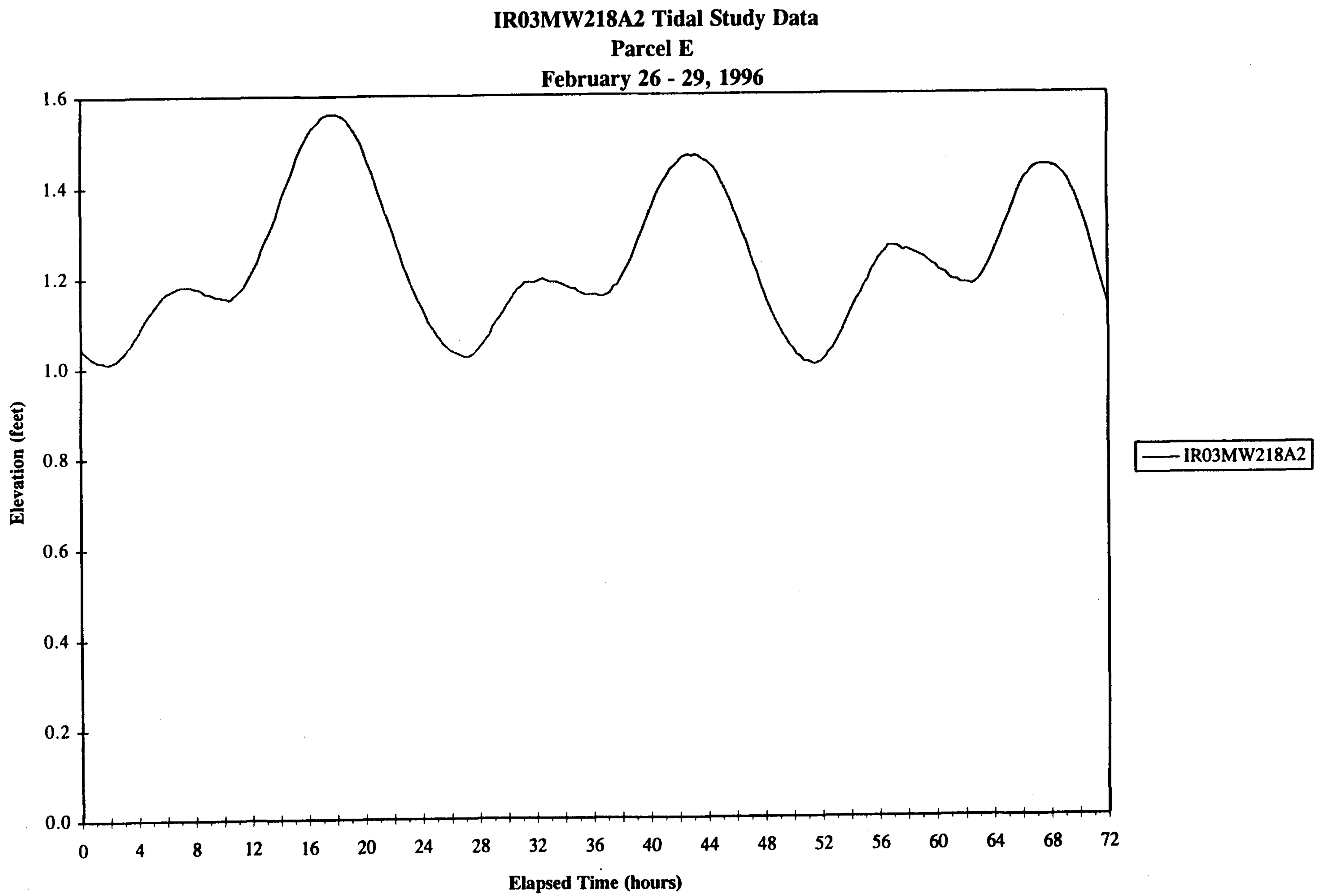
IR02MWB-2 Tidal Study Data
Parcel E
March 1 - 4, 1996

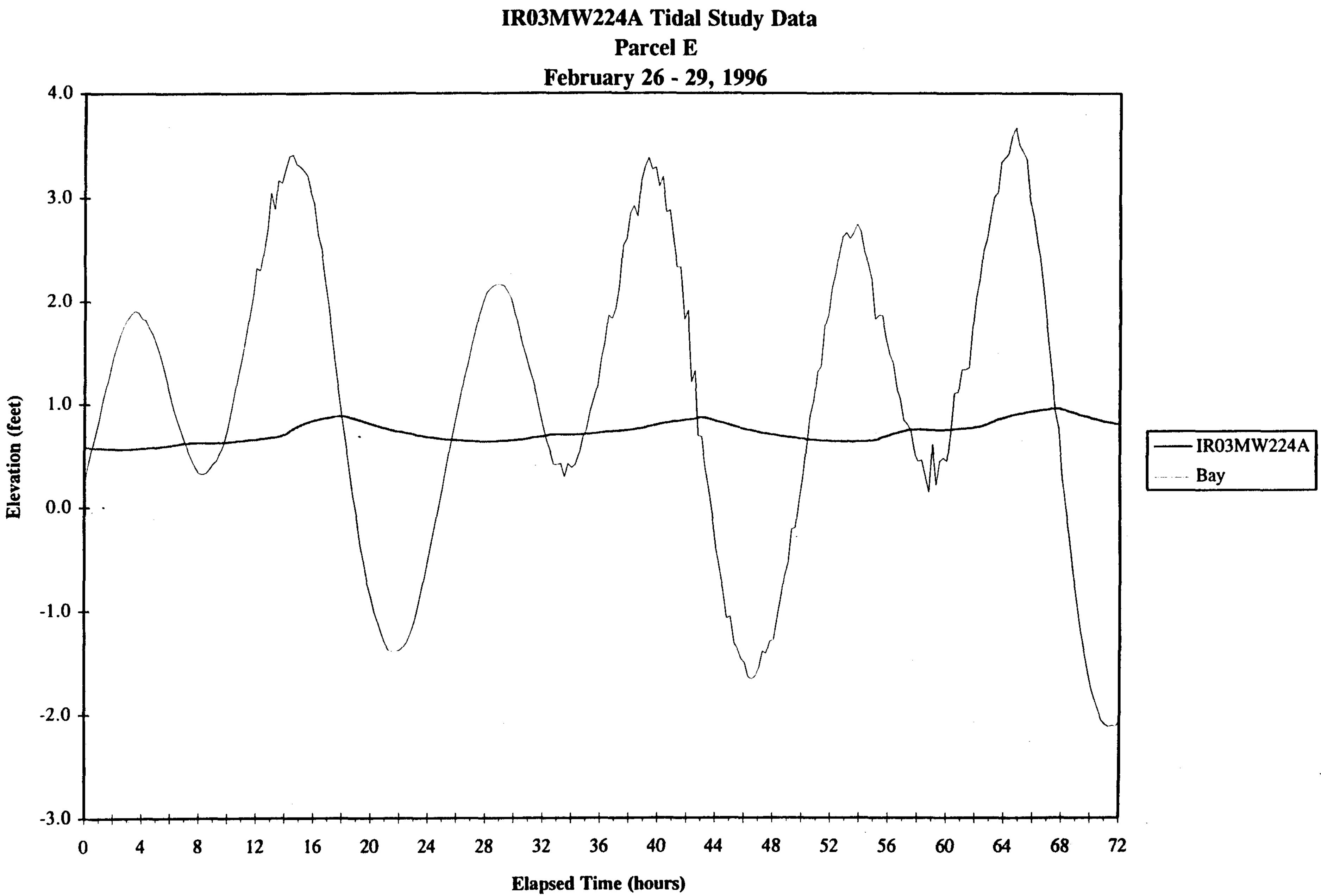




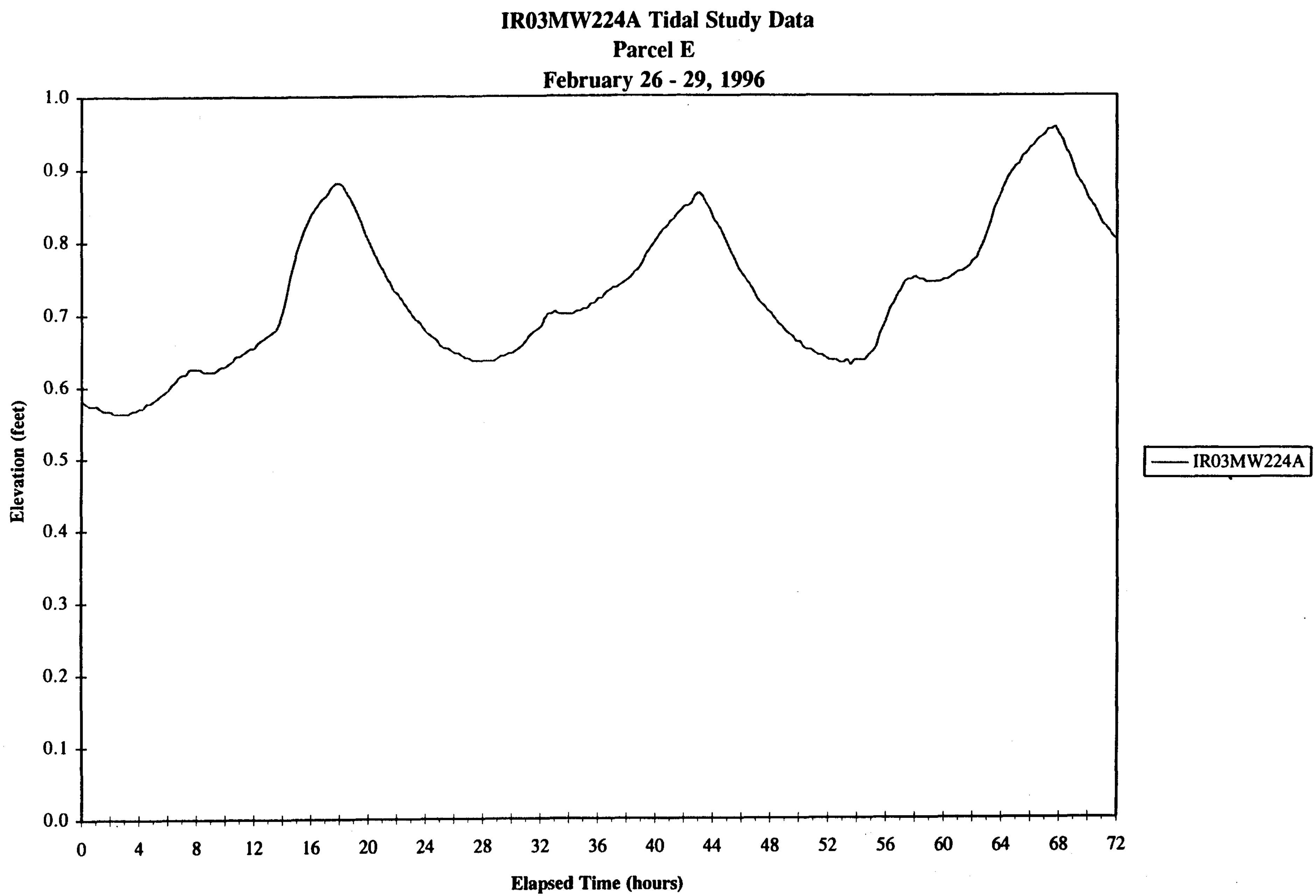
IR02MWB-2 Tidal Study Data
Parcel E
March 1 - 4, 1996
Elevation (feet)
3.5
3.4
3.3
3.2
3.1
3.0
2.9
2.8
2.7
2.6
2.5
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR02MWB-2


IR03MW218A2 Tidal Study Data
Parcel E
February 26 - 29, 1996
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR03MW218A2
Bay

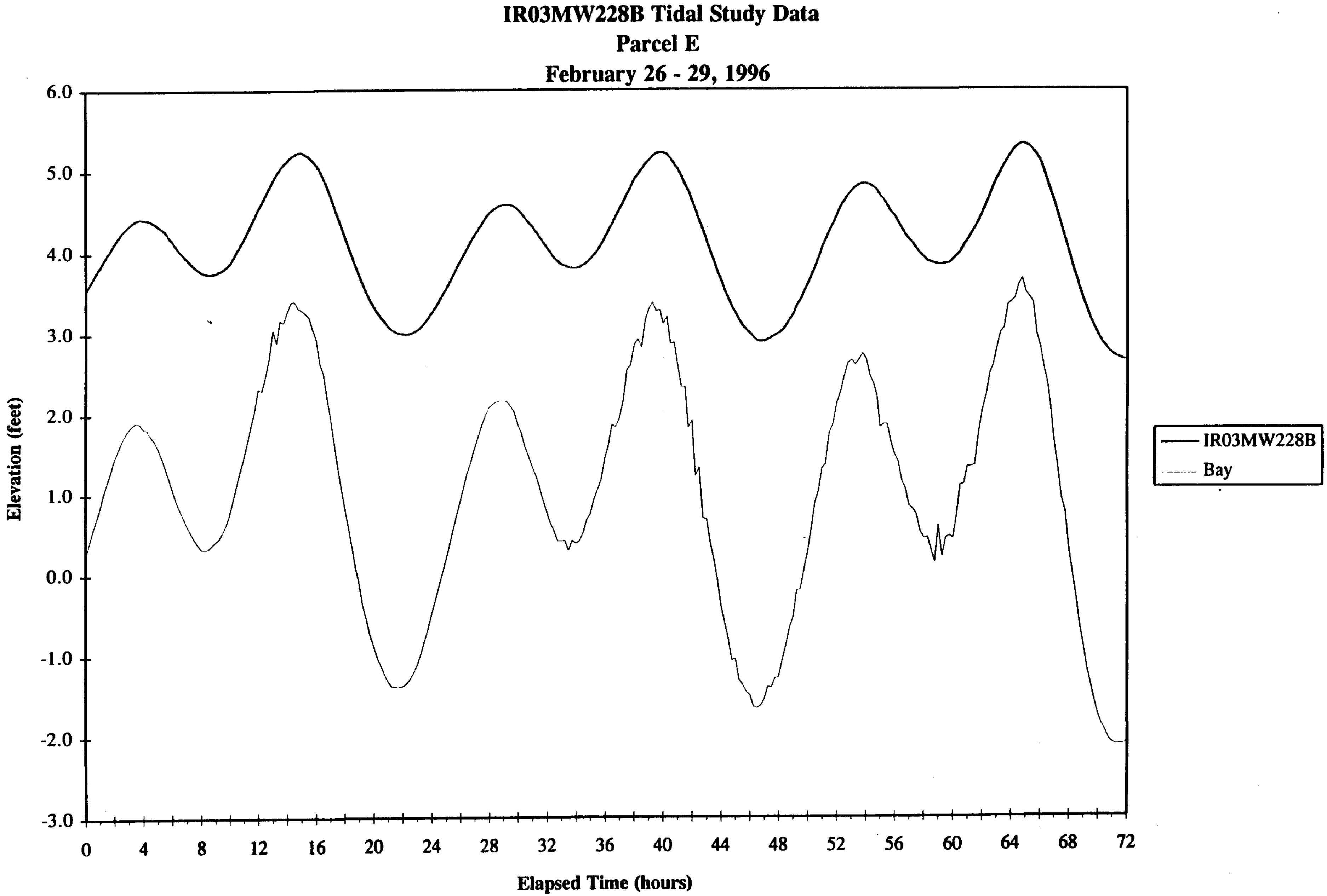

IR03MW218A2 Tidal Study Data
Parcel E
February 26 - 29, 1996
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR03MW218A2

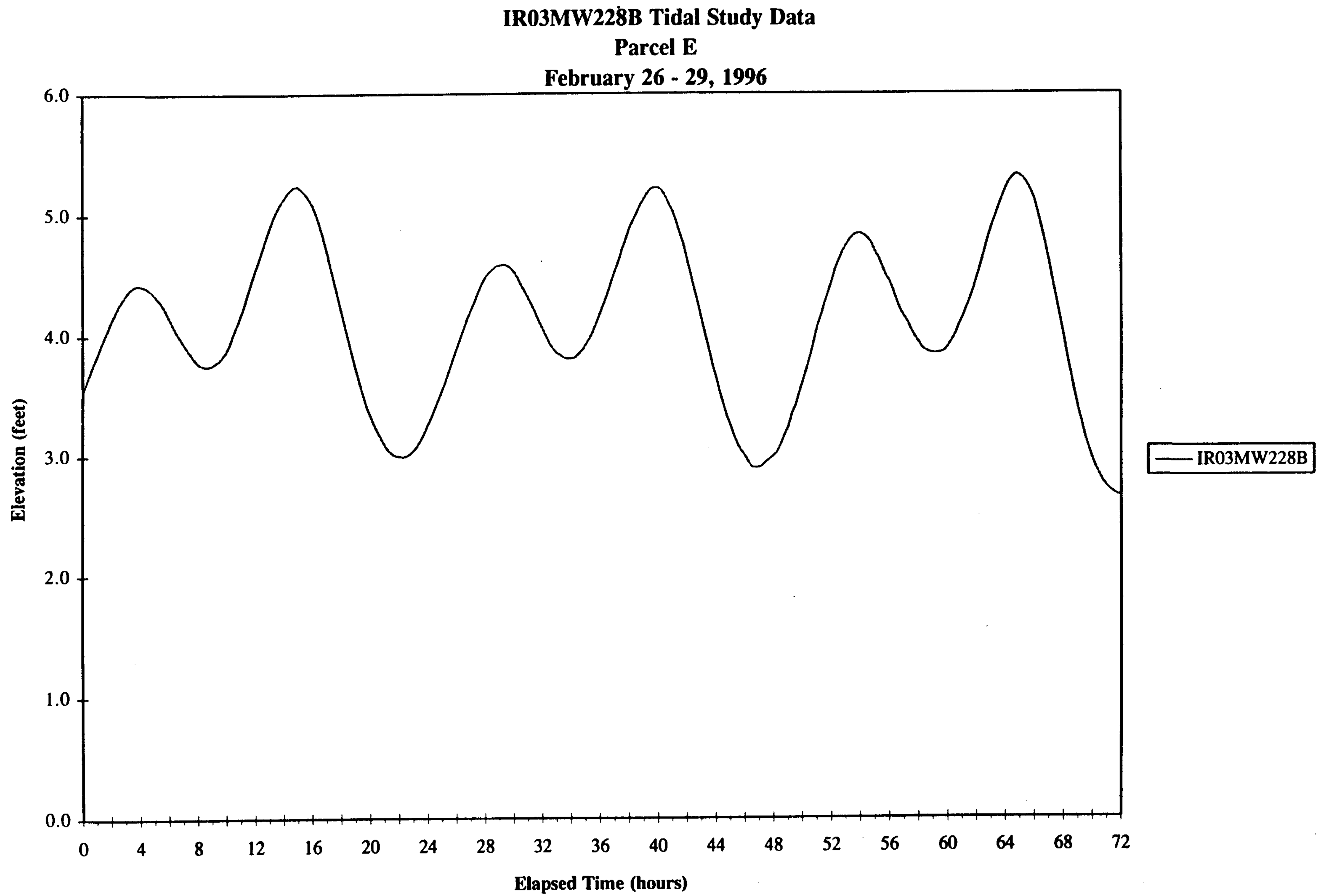


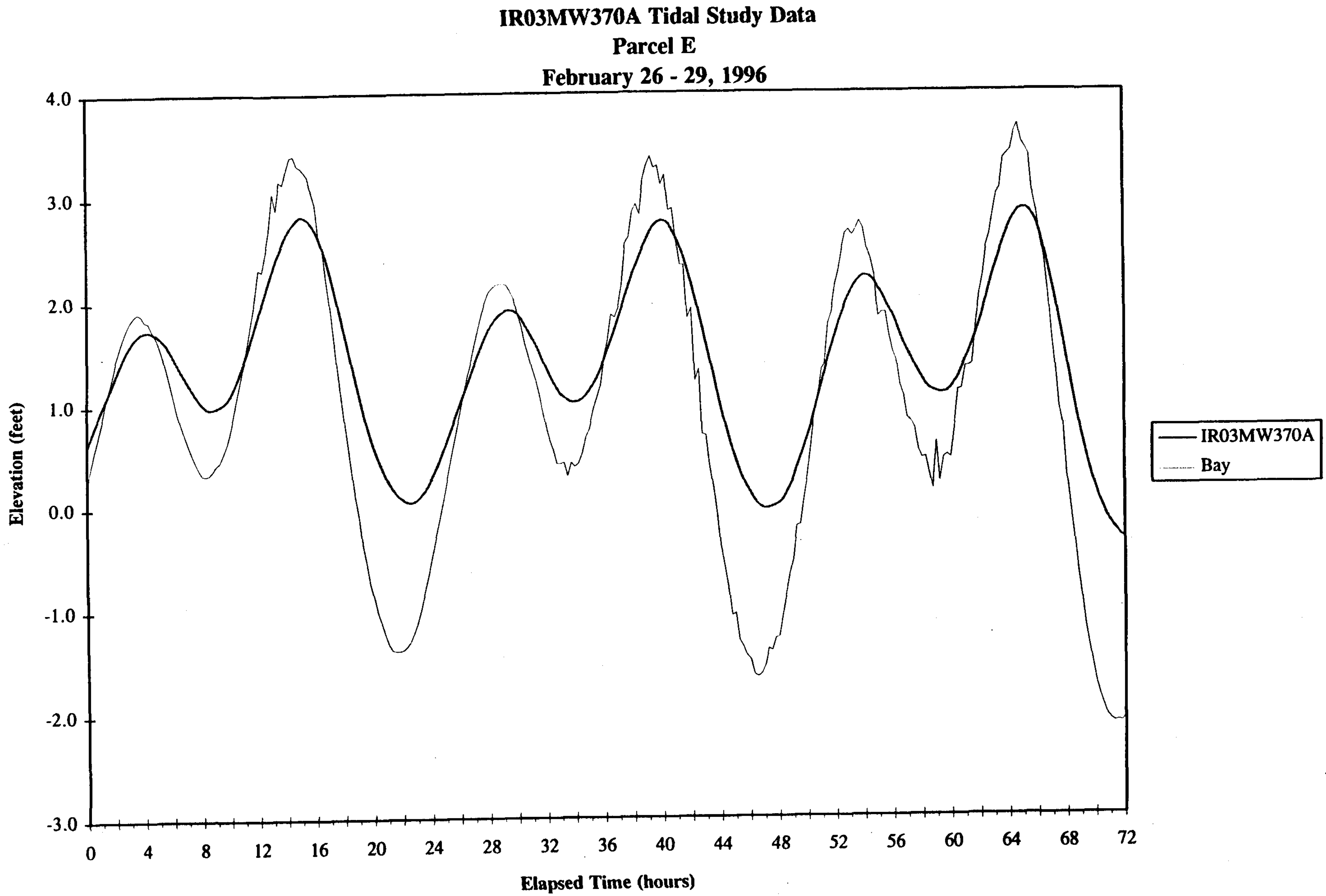
IR03MW224A Tidal Study Data
Parcel E
February 26 - 29, 1996
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR03MW224A
Bay



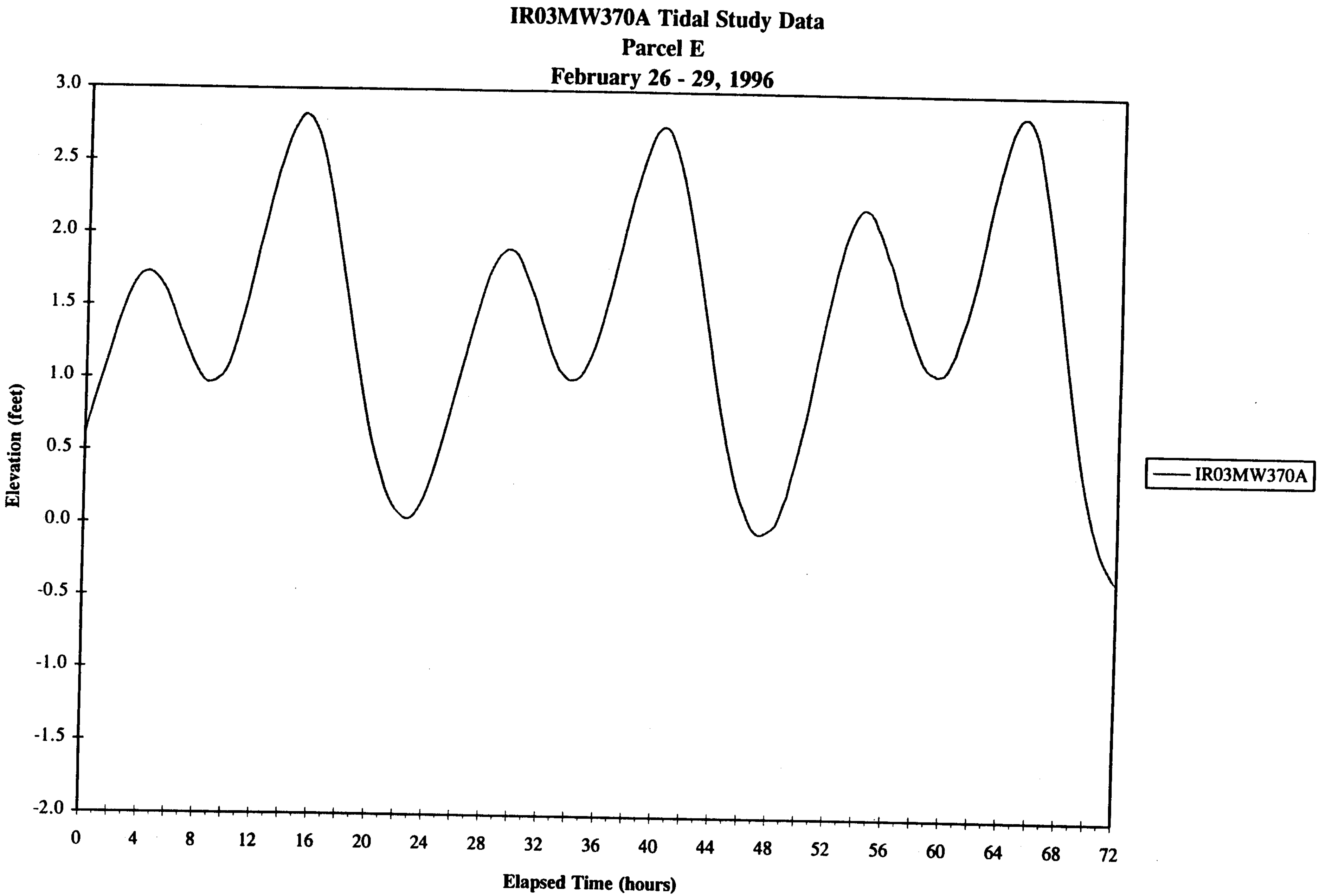
IR03MW224A Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72
Elapsed Time (hours)
IR03MW224A

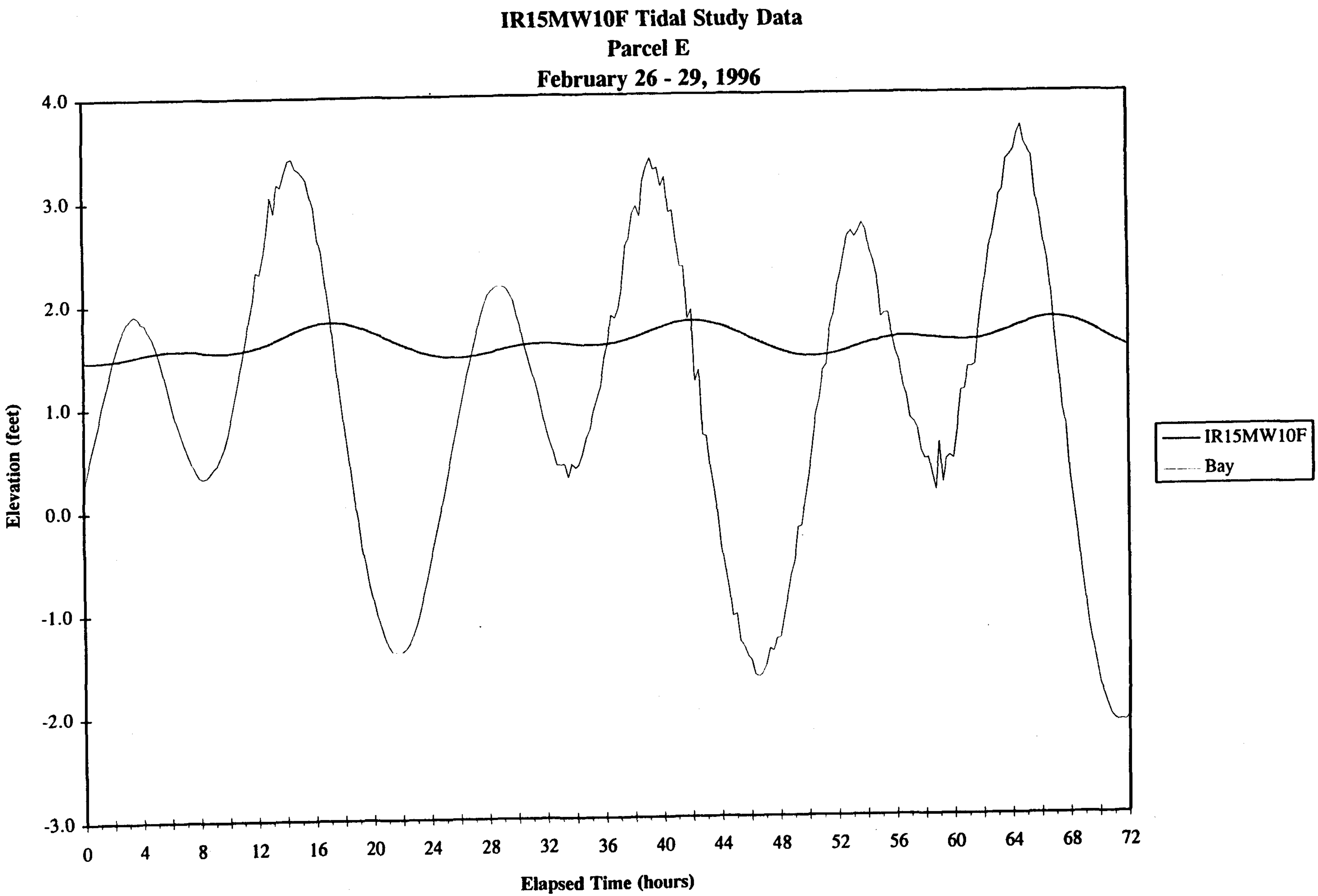

IR03MW228B Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR03MW228B
Bay


IR03MW228B Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR03MW228B



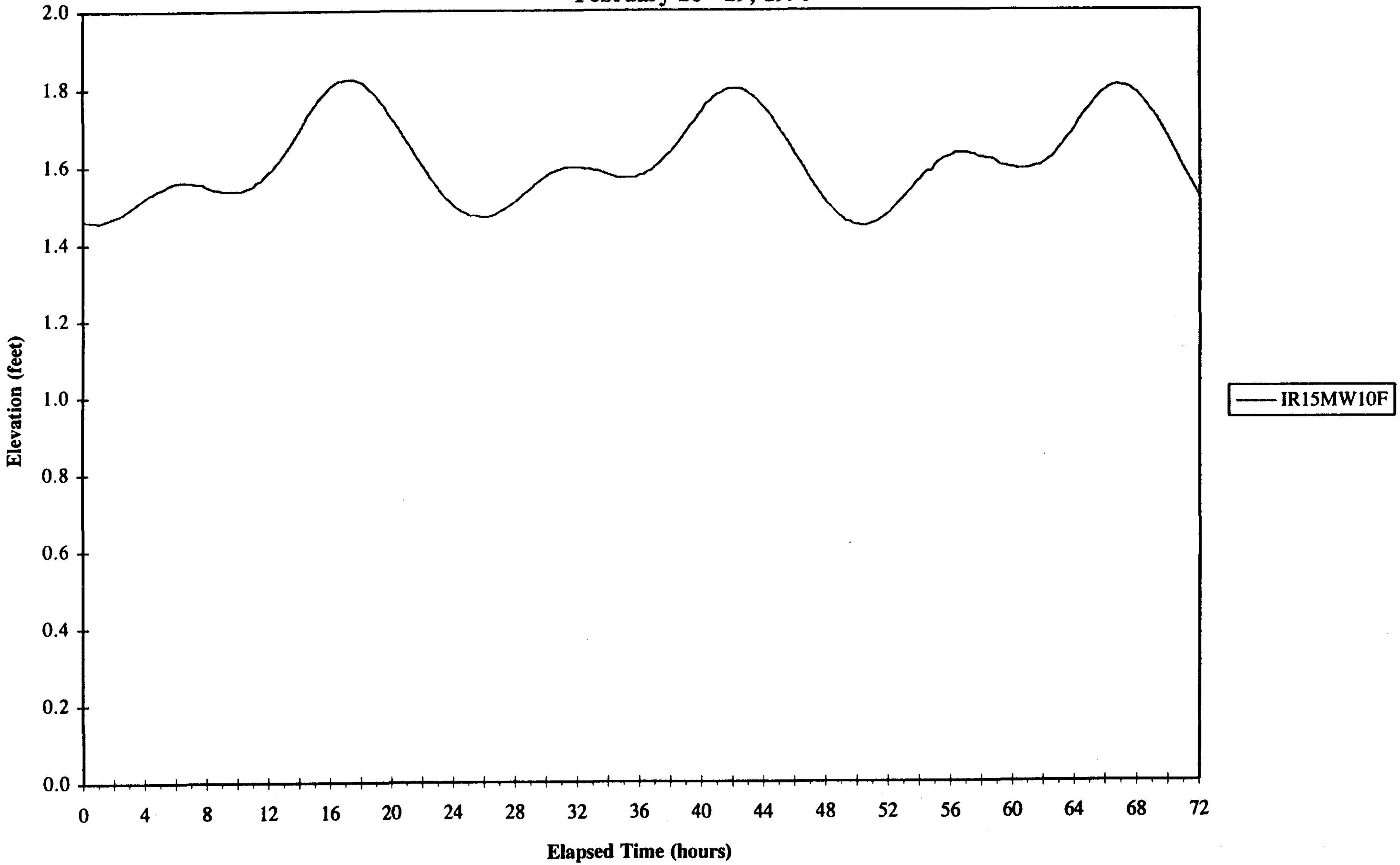
IR03MW370A Tidal Study Data
Parcel E
February 26 - 29, 1996
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR03MW370A
Bay

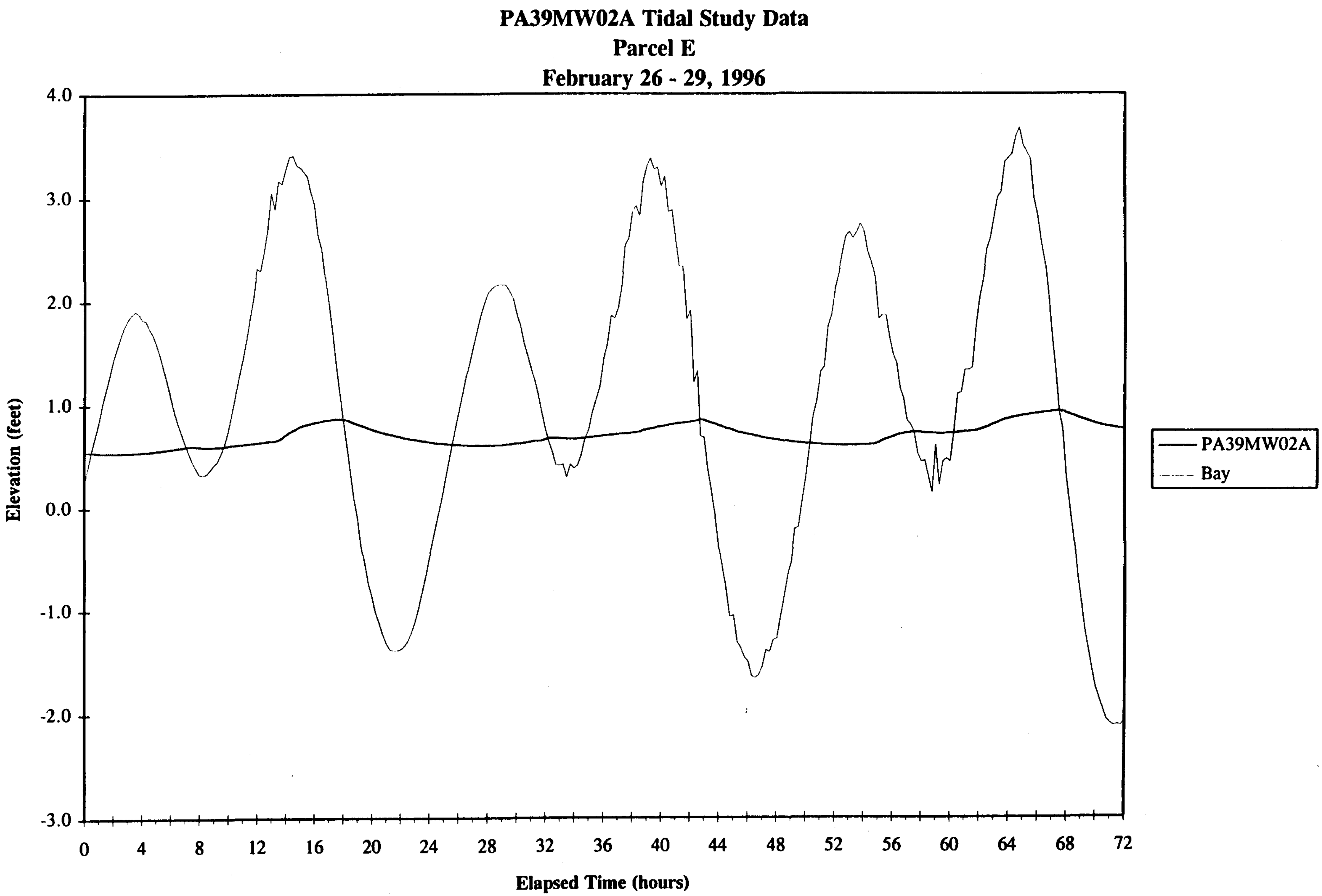

IR03MW370A Tidal Study Data
Parcel E
February 26 - 29, 1996
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
Elevation (feet)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR03MW370A



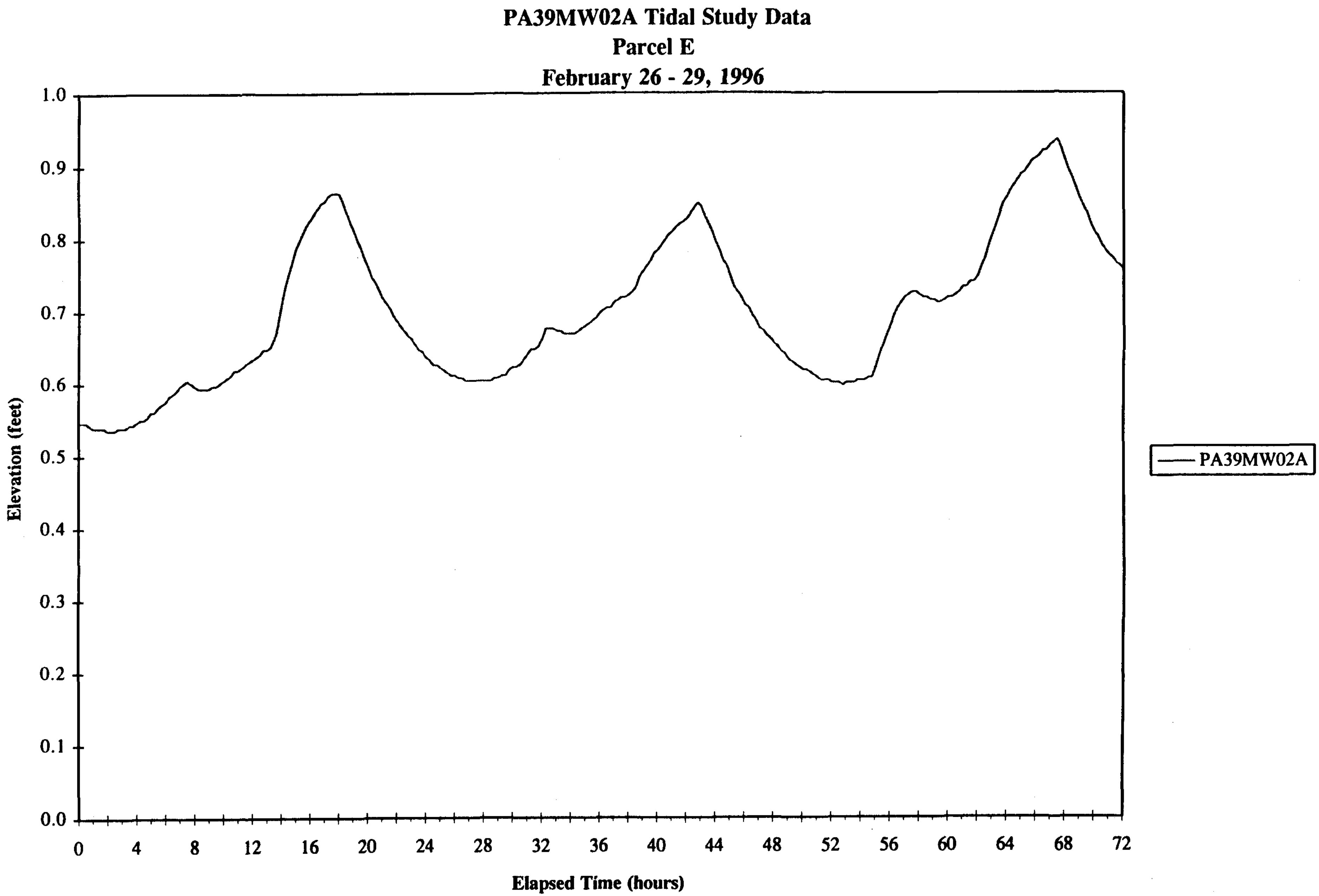
IR15MW10F Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
IR15MW10F
Bay

IR15MW10F Tidal Study Data
Parcel E
February 26 - 29, 1996





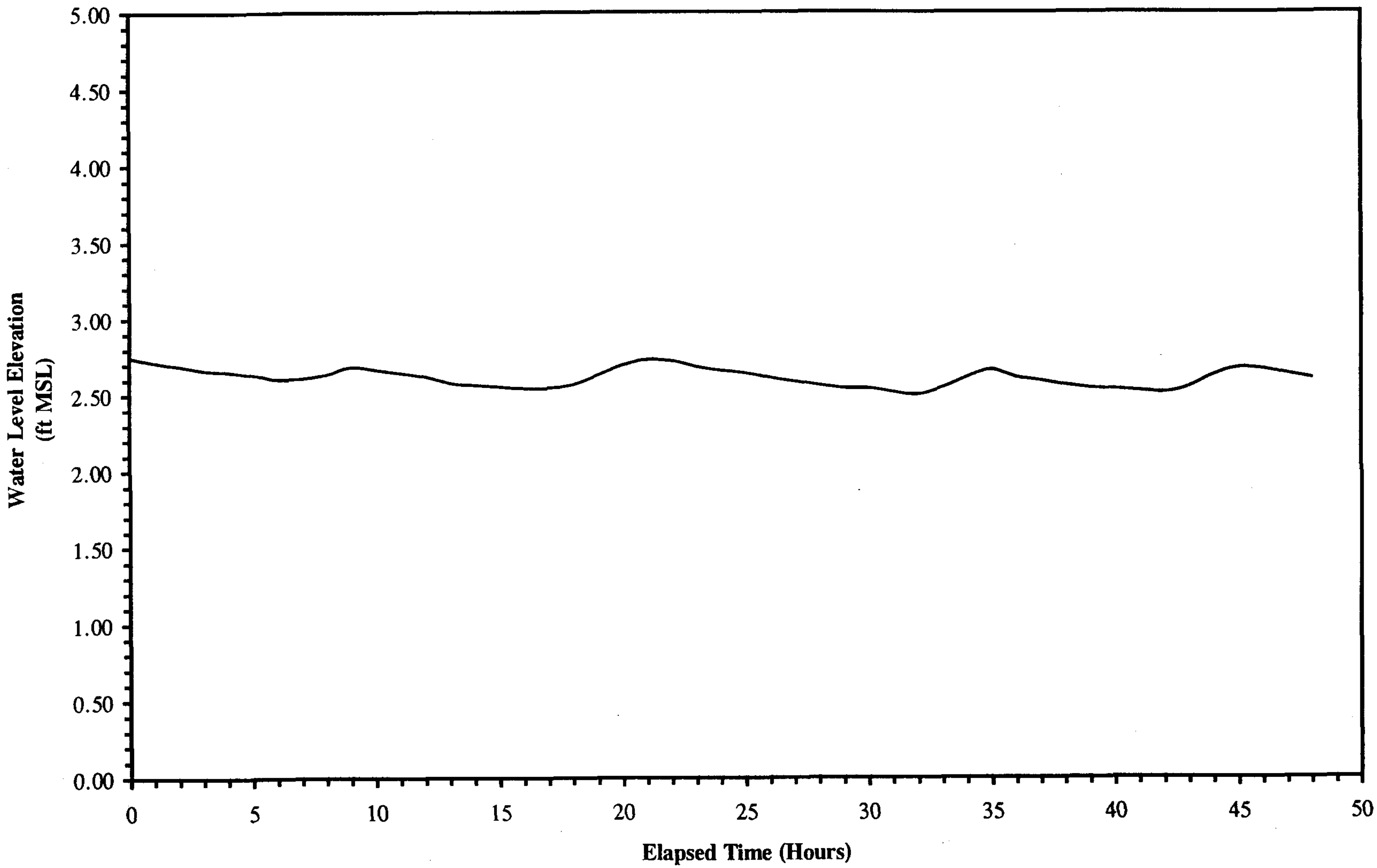
PA39MW02A Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
PA39MW02A
Bay


PA39MW02A Tidal Study Data
Parcel E
February 26 - 29, 1996
Elevation (feet)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
Elapsed Time (hours)
PA39MW02A

C1-E

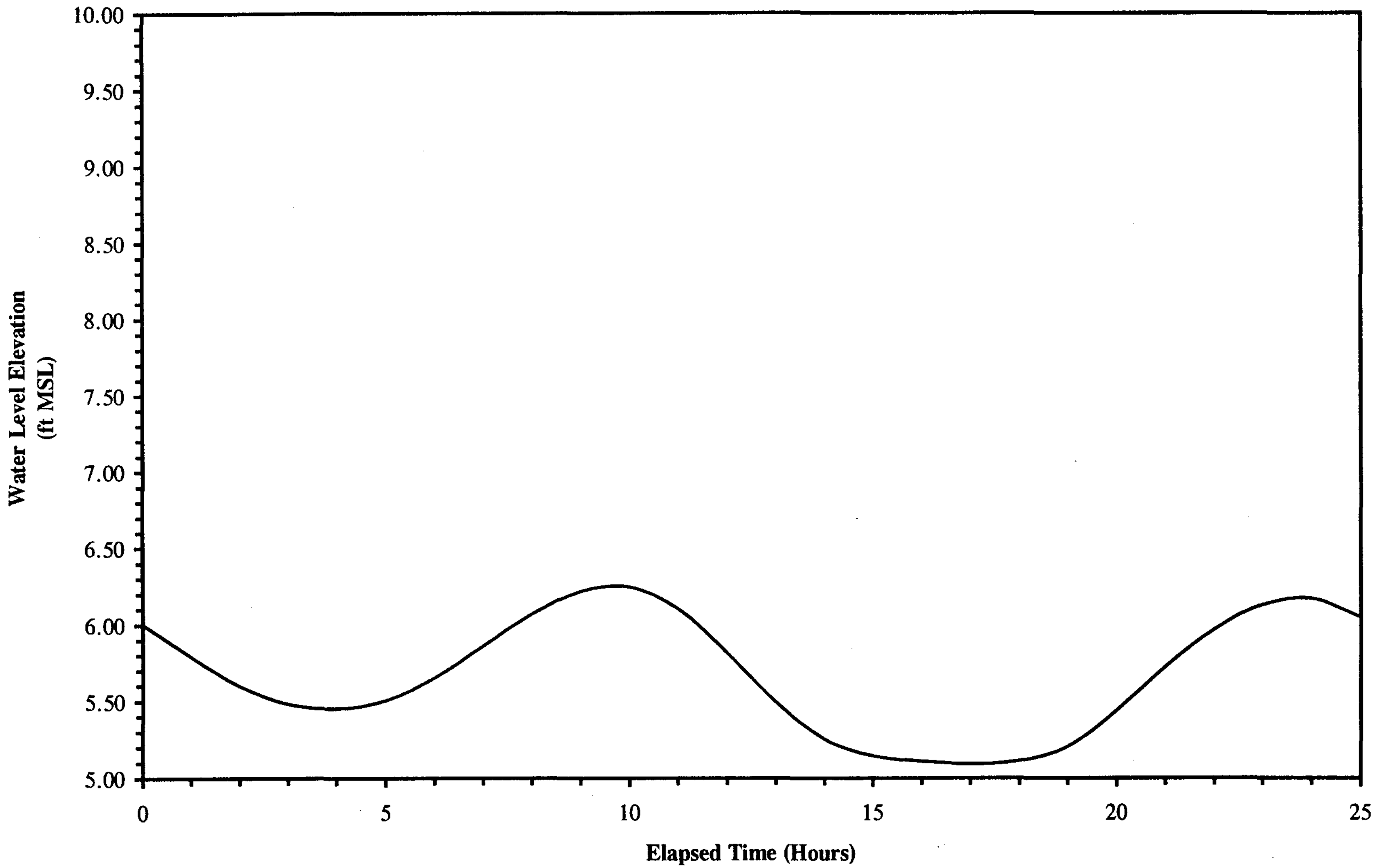
HYDROGRAPHS FOR
FIFTH ROUND OF TIDAL INFLUENCE MONITORING

HYDROGRAPH
MONITORING WELL IR01MW48A



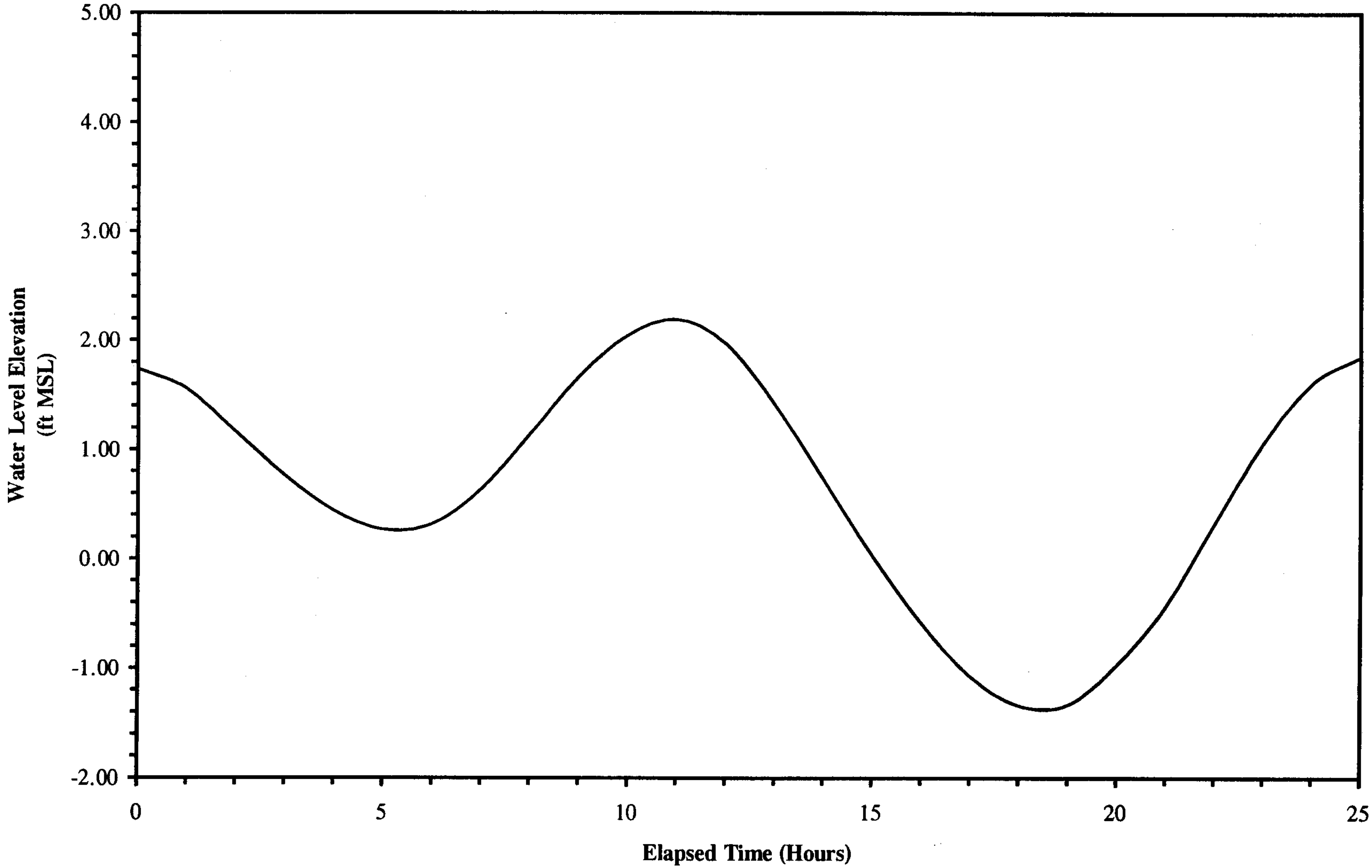
Monitoring Period Began at 11:00 am on 4/10/96

HYDROGRAPH
MONITORING WELL IR01MW53B



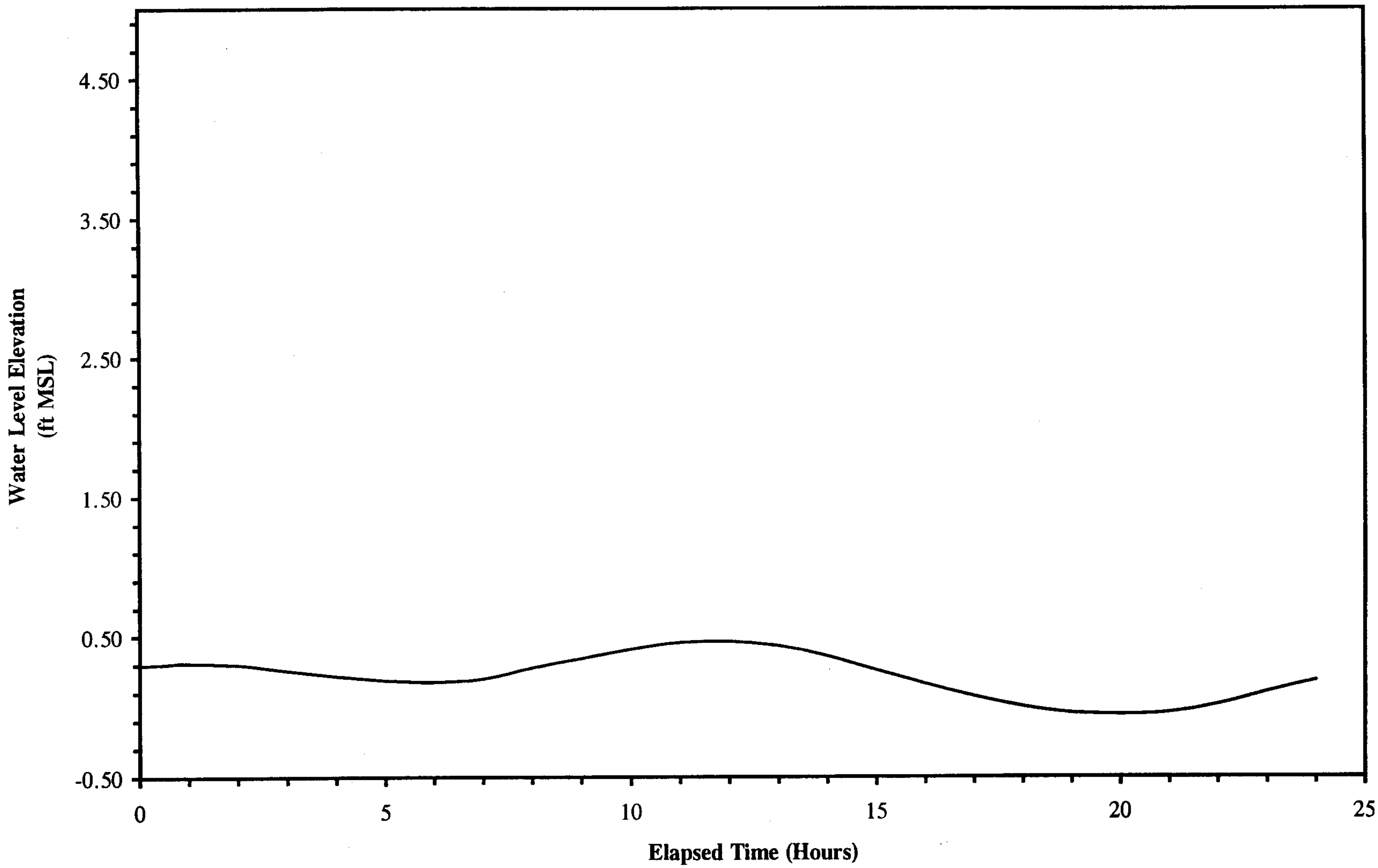
Monitoring Period Began at 21:00 am on 4/10/96

HYDROGRAPH
MONITORING WELL IR02MW179A



Monitoring Period Began at 21:00 am on 4/10/96

HYDROGRAPH
MONITORING WELL IR02MW218A2



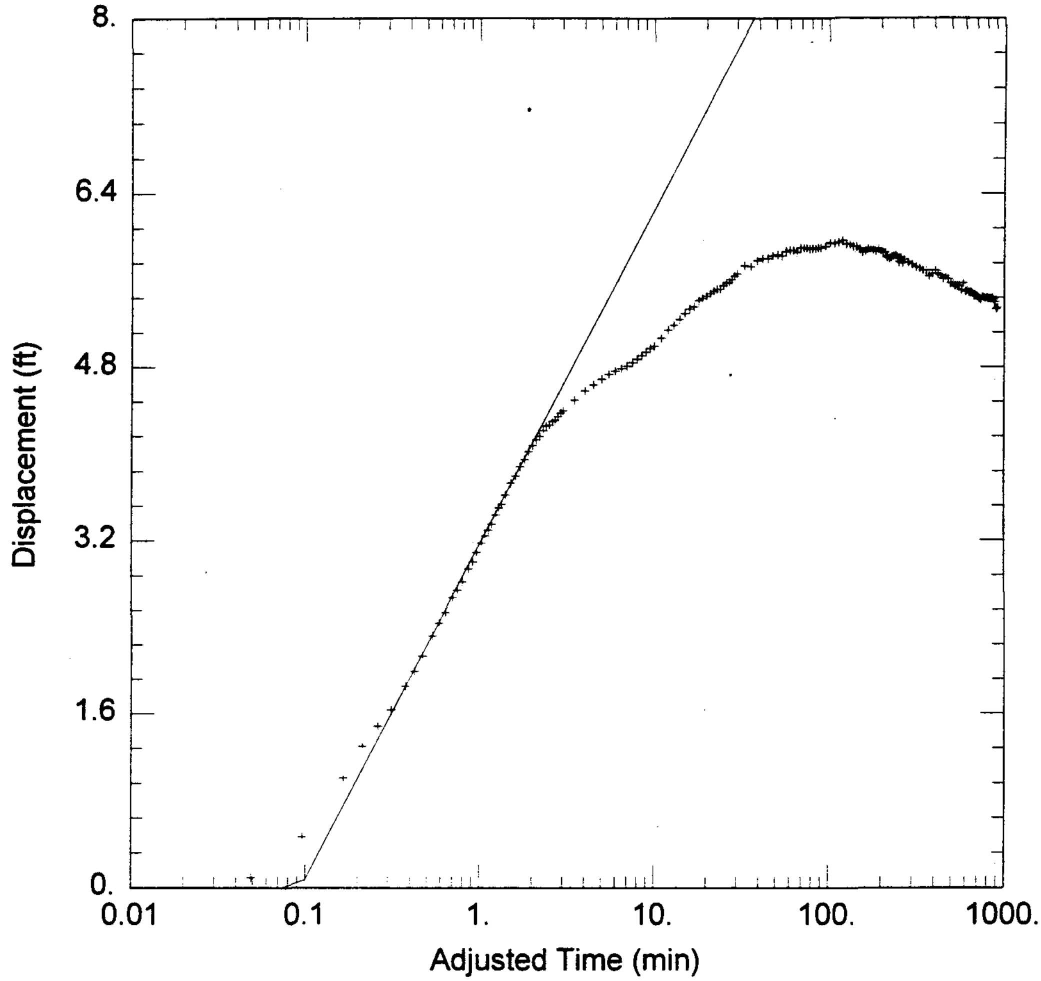
Monitoring Period Began at 21:00 am on 4/10/96

ATTACHMENT C2

MATCHING CURVE AND ESTIMATE HYDRAULIC PROPERTIES FOR CONSTANT-RATE PUMPING TESTS 1 THROUGH 14

C2-A

MATCHING CURVE AND ESTIMATED HYDRAULIC PROPERTIES FOR CONSTANT-RATE PUMPING TEST 1



TEST E04, WELL IR01MW03A

Data Set: G:\EPUMPT\E04PWDD.AQT
Date: 02/14/97 Time: 10:54:53

AQUIFER DATA

Saturated Thickness: 13.01 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

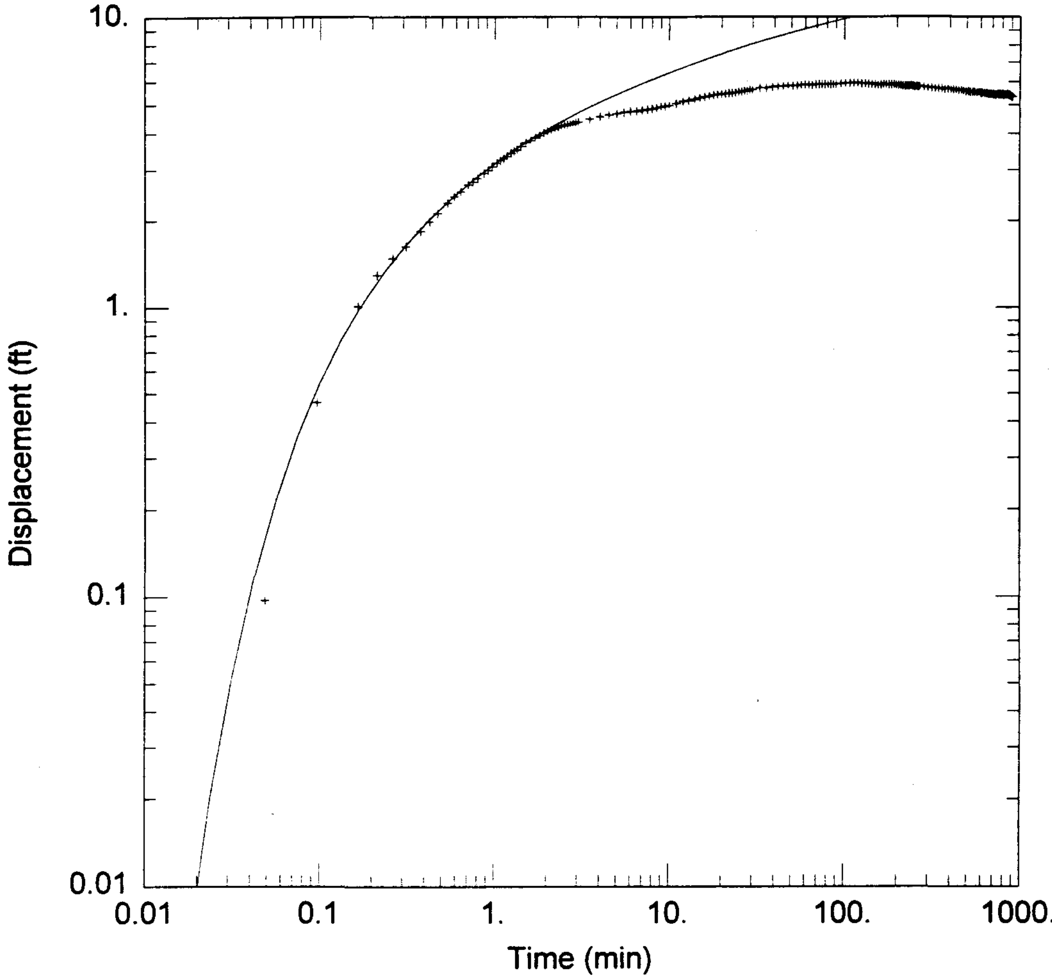
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01MW03A	0.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.03373 ft^2/min
S = 0.02868



TEST E04, WELL IR01MW03A

Data Set: G:\EPUMPT\E04PWDD.AQT
Date: 02/14/97 Time: 09:47:05

AQUIFER DATA

Saturated Thickness: 13.01 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

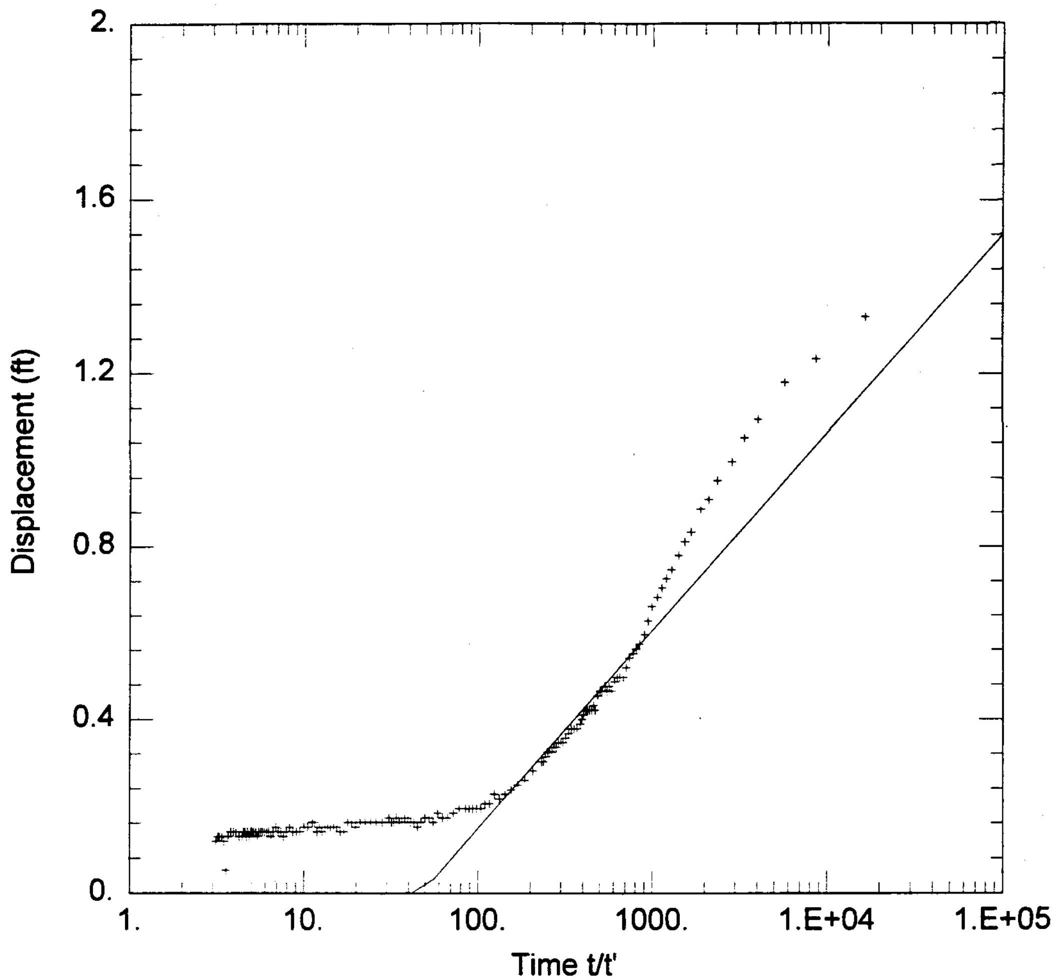
Observation Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.03069 ft^2/min
S = 0.03453



TEST E04, WELL IR01MW03A RECOVERY

Data Set: G:\EPUMPT\E04PWRD.AQT
Date: 02/14/97 Time: 11:44:35

AQUIFER DATA

Saturated Thickness: 13.01 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

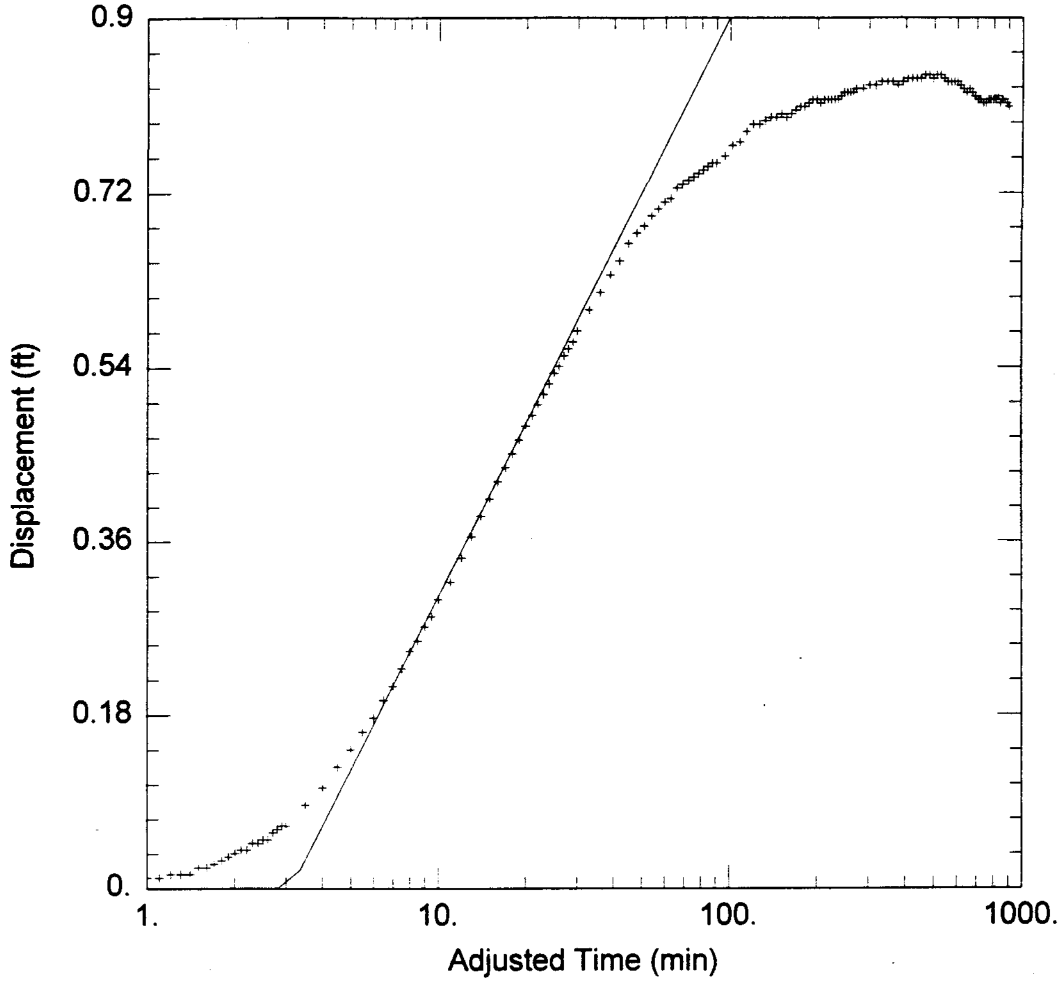
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01MW03A	0.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.2277 ft^2/min
S' = 47.59



TEST E04, WELL IR01MW02B DRAWDOWN

Data Set: G:\EPUMPT\E04OW4DD.AQT
Date: 02/14/97 Time: 17:13:15

AQUIFER DATA

Saturated Thickness: 17. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

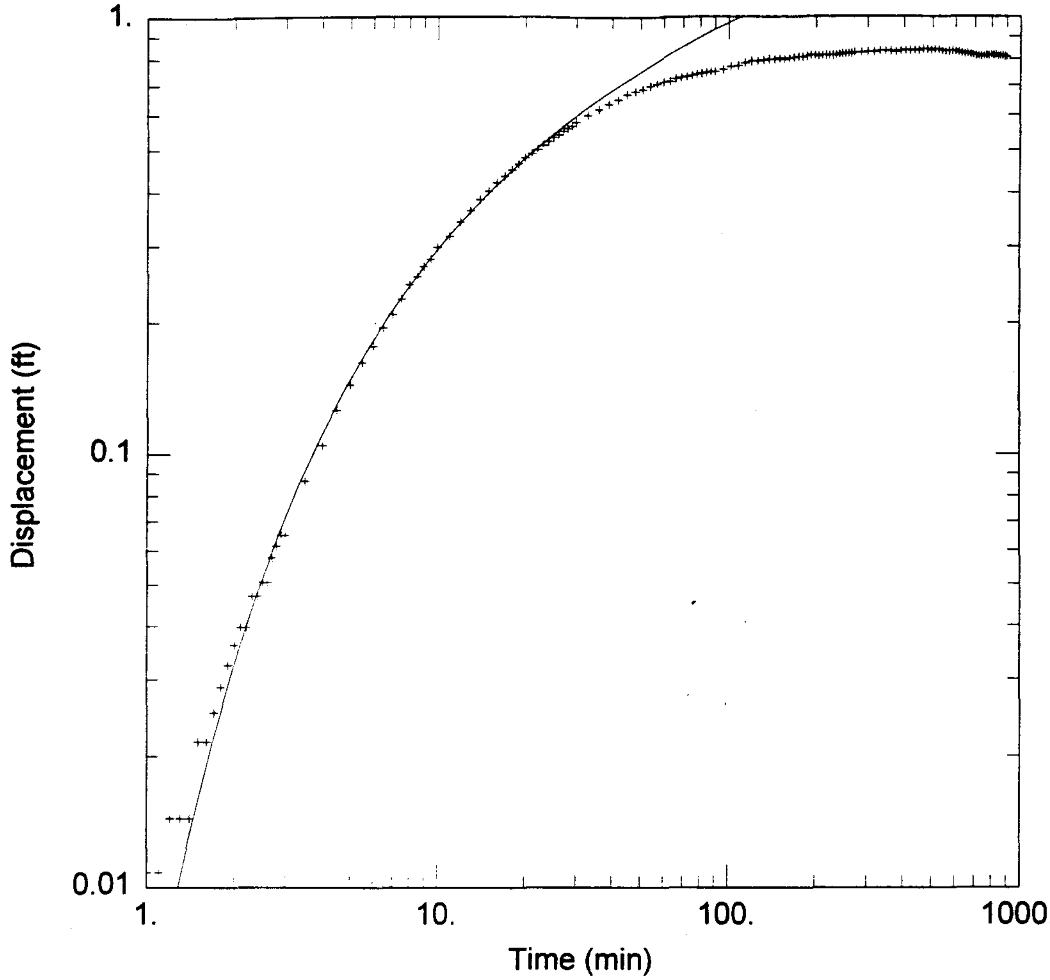
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01MW02B	10	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.1742 ft^2/min
S = 0.01221



TEST E04, WELL IR01MW02B DRAWDOWN

Data Set:
Date: 02/14/97 Time: 16:51:41

AQUIFER DATA

Saturated Thickness: 17. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

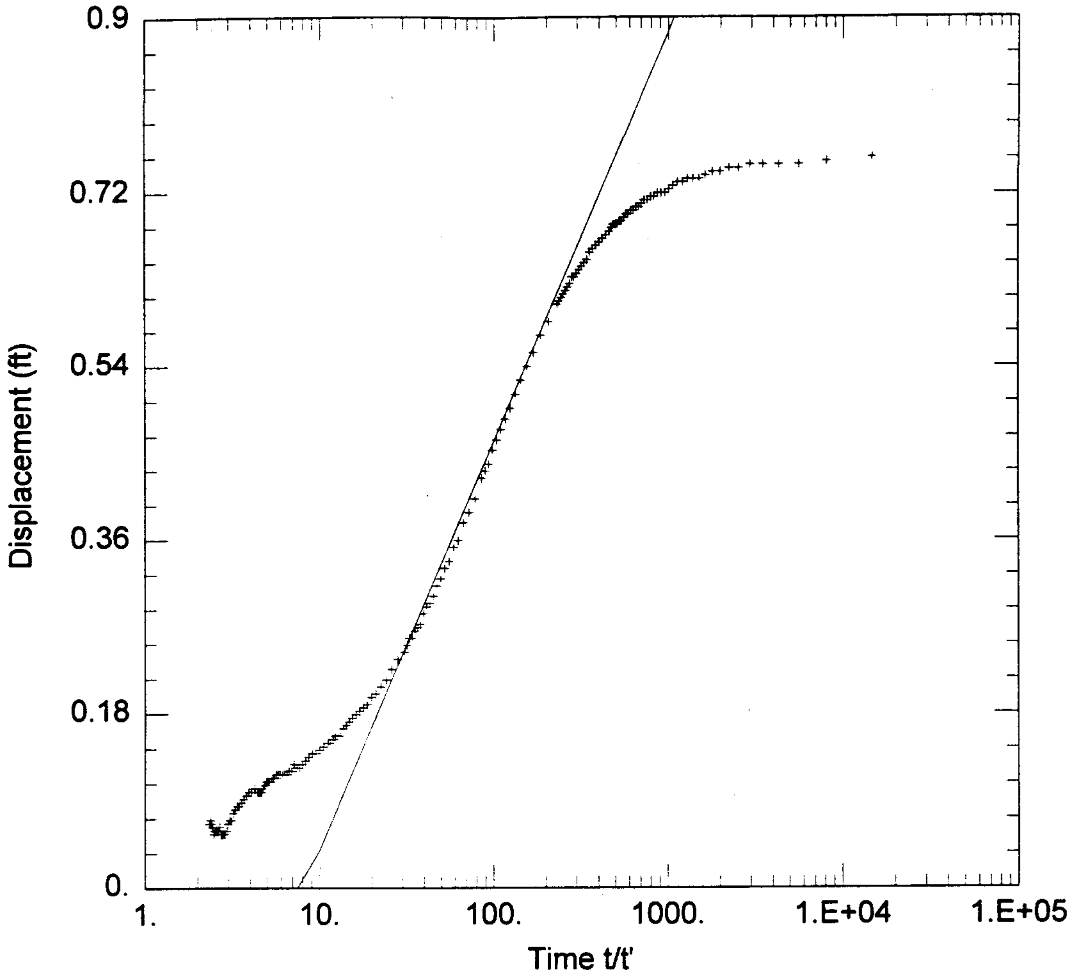
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01MW02B	10	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.1382 ft^2/min
S = 0.01661



TEST E04, WELL IR01MW02B RECOVERY

Data Set: G:\EPUMPT\E04OW4RD.AQT
Date: 02/14/97 Time: 16:56:30

AQUIFER DATA

Saturated Thickness: 17. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

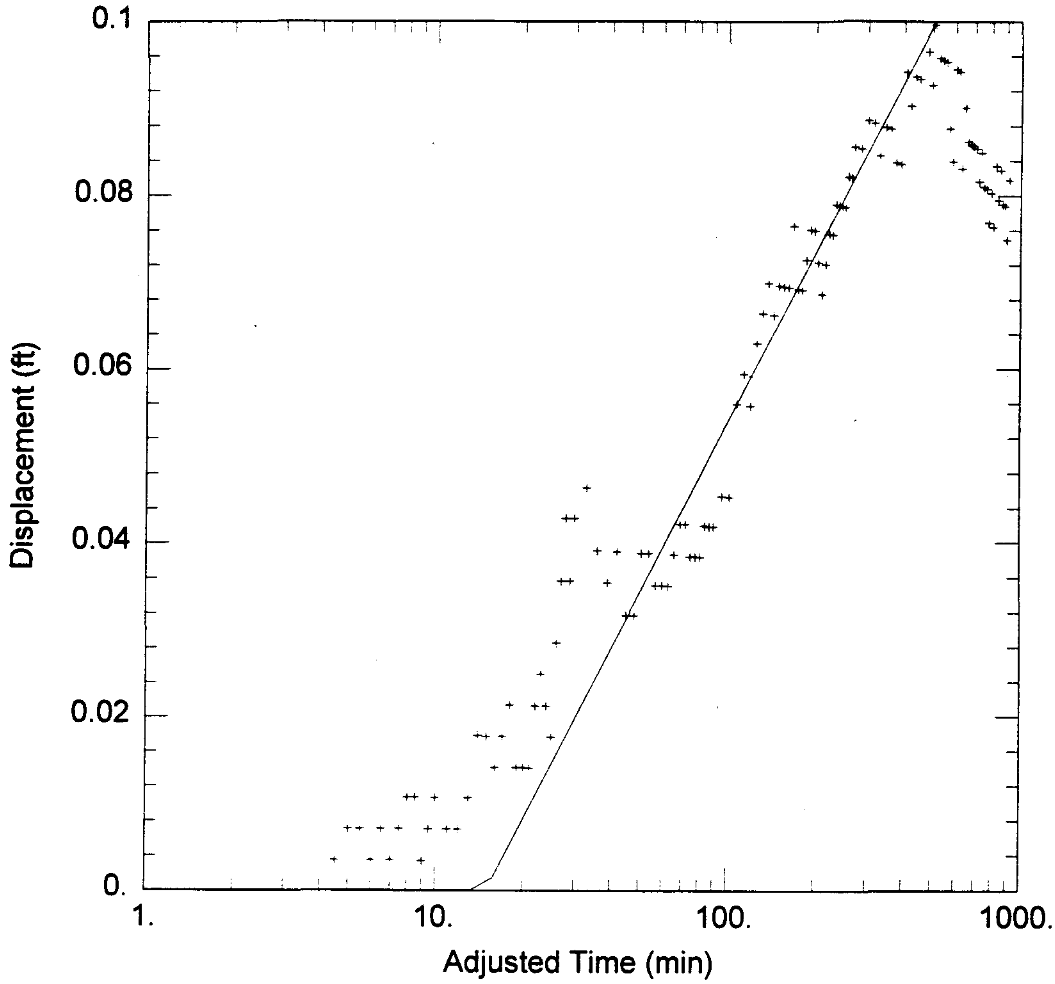
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01MW02B	10	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.2461 ft^2/min
S' = 8.104



TEST E04, WELL IR01P03A (CORRECTED)

Data Set: G:\EPUMPT\E04OW3DD.AQT
Date: 02/14/97 Time: 16:36:08

AQUIFER DATA

Saturated Thickness: 12.82 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

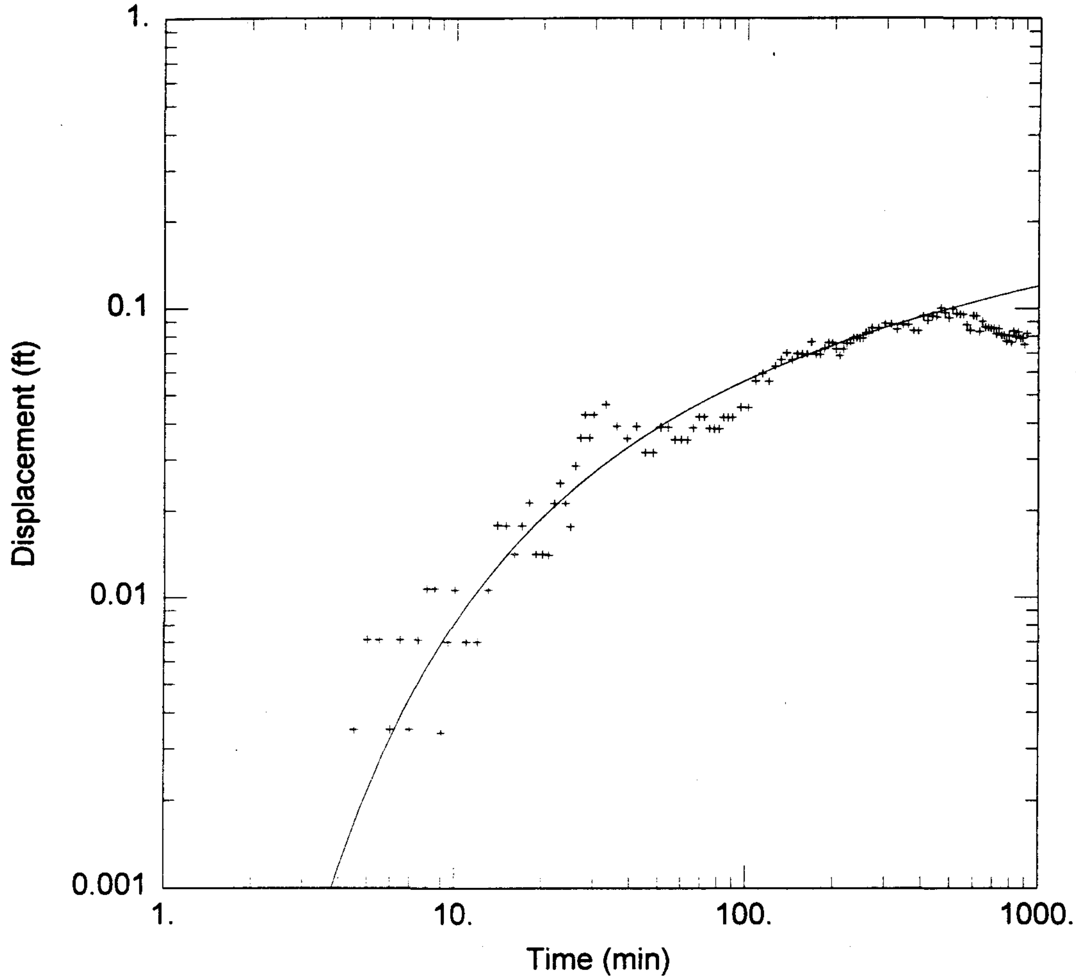
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03A	27.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 1.592 ft^2/min
S = 0.07018



TEST E04, WELL IR01P03A (CORRECTED)

Data Set: G:\EPUMPT\E04OW3DD.AQT
Date: 02/14/97 Time: 16:11:57

AQUIFER DATA

Saturated Thickness: 12.82 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

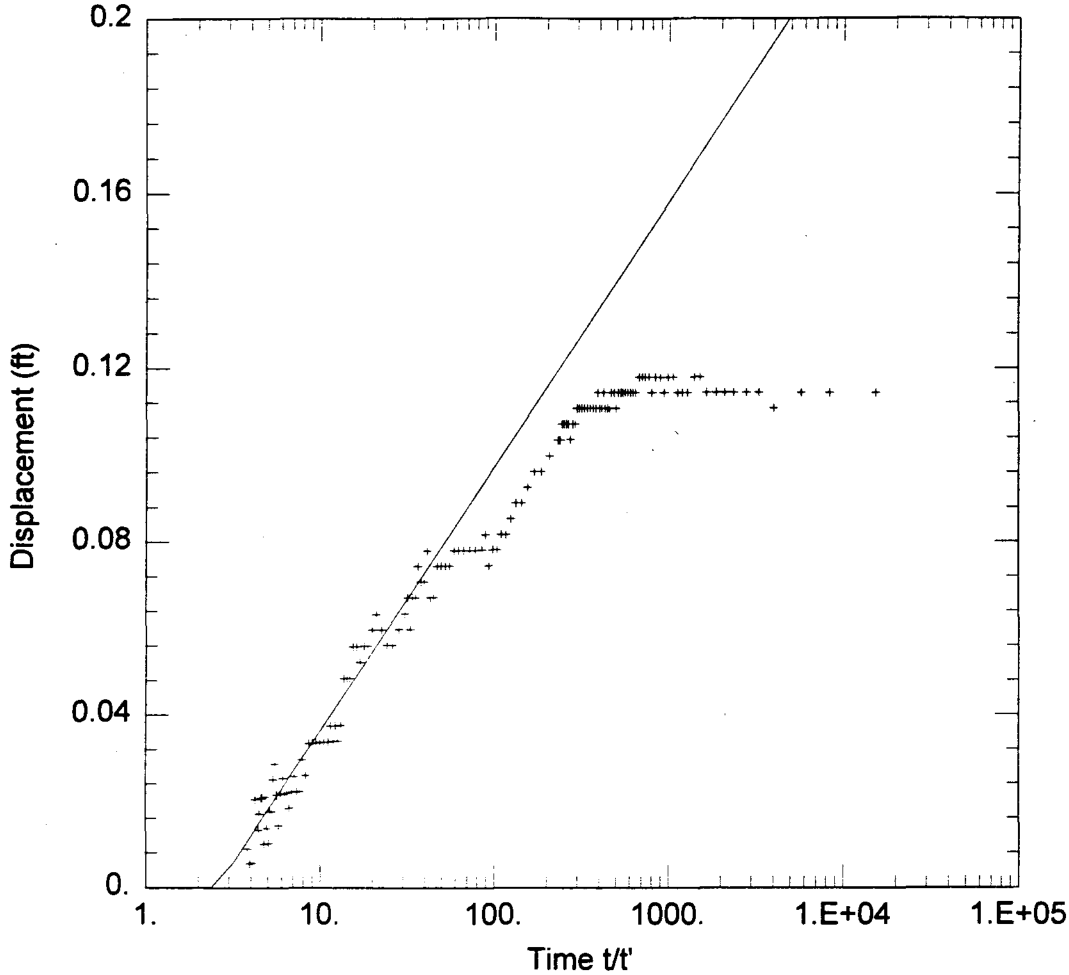
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03A	27.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1.592 ft^2/min
S = 0.07018



TEST E04, IR01P03A RECOVERY (CORRECTED)

Data Set: G:\EPUMPT\E04OW3RD.AQT
Date: 02/14/97 Time: 13:15:16

AQUIFER DATA

Saturated Thickness: 12.82 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

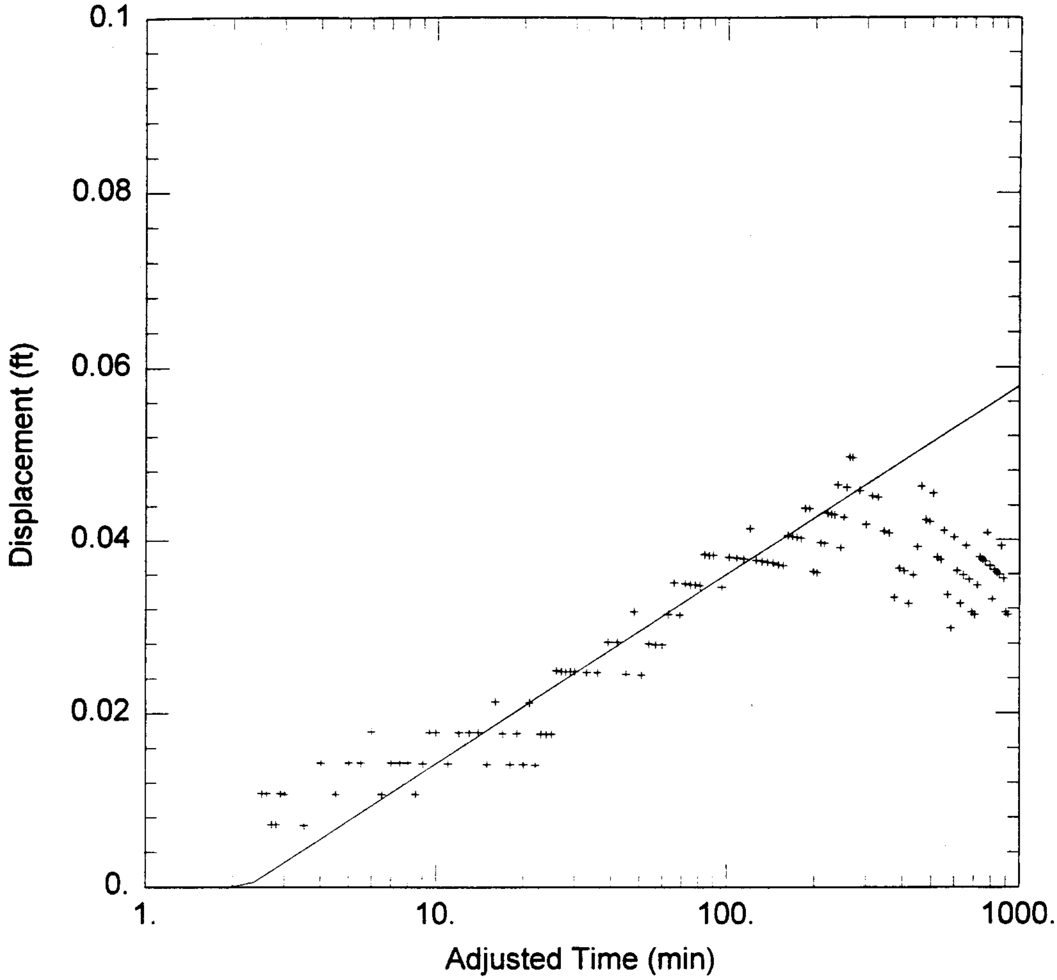
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03A	27.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 1.709 ft^2/min
S' = 2.552



TEST E04, WELL IR01P03AA (CORRECTED)

Data Set: G:\EPUMPT\E04OW1DD.AQT
Date: 02/14/97 Time: 16:34:43

AQUIFER DATA

Saturated Thickness: 11.04 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

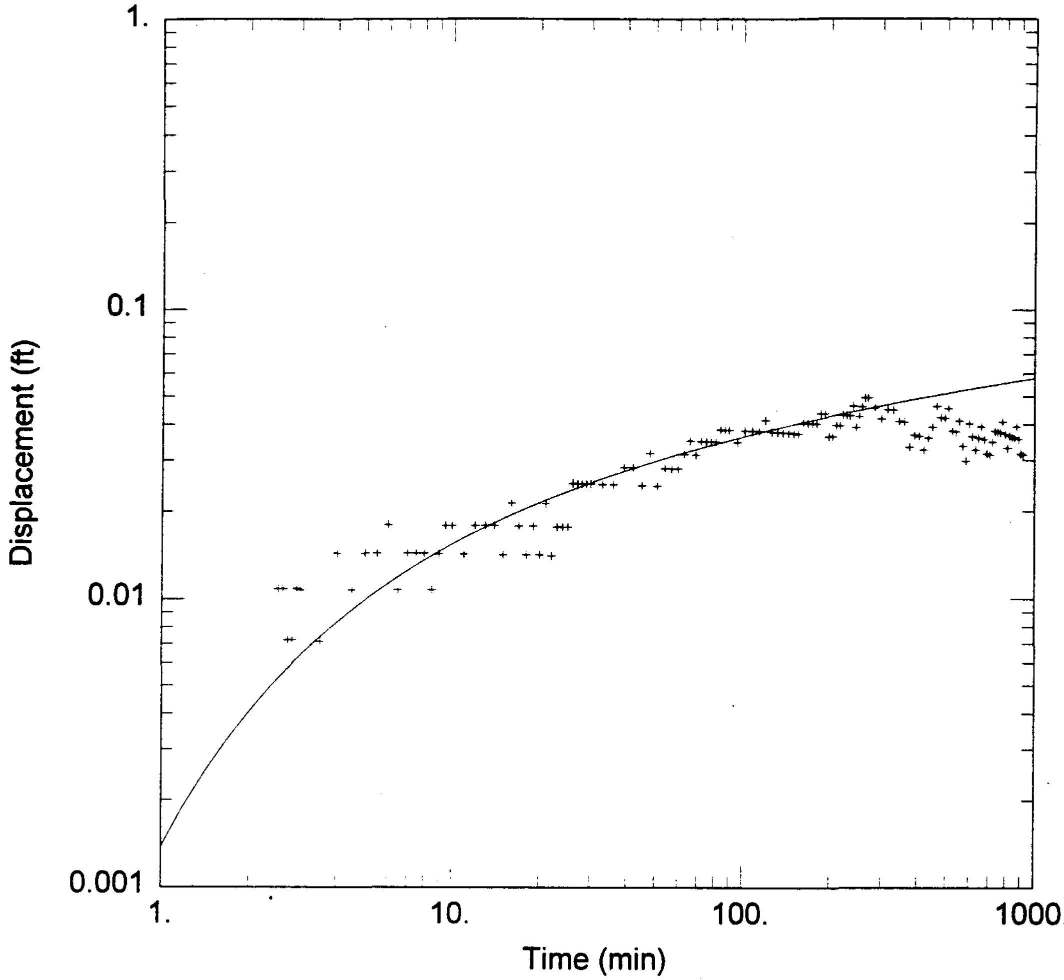
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03AA	12	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 4.776 ft^2/min
S = 0.1664



TEST E04, WELL IR01P03AA (CORRECTED)

Data Set: G:\EPUMPT\E04OW1DD.AQT
Date: 02/14/97 Time: 16:15:42

AQUIFER DATA

Saturated Thickness: 11.04 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

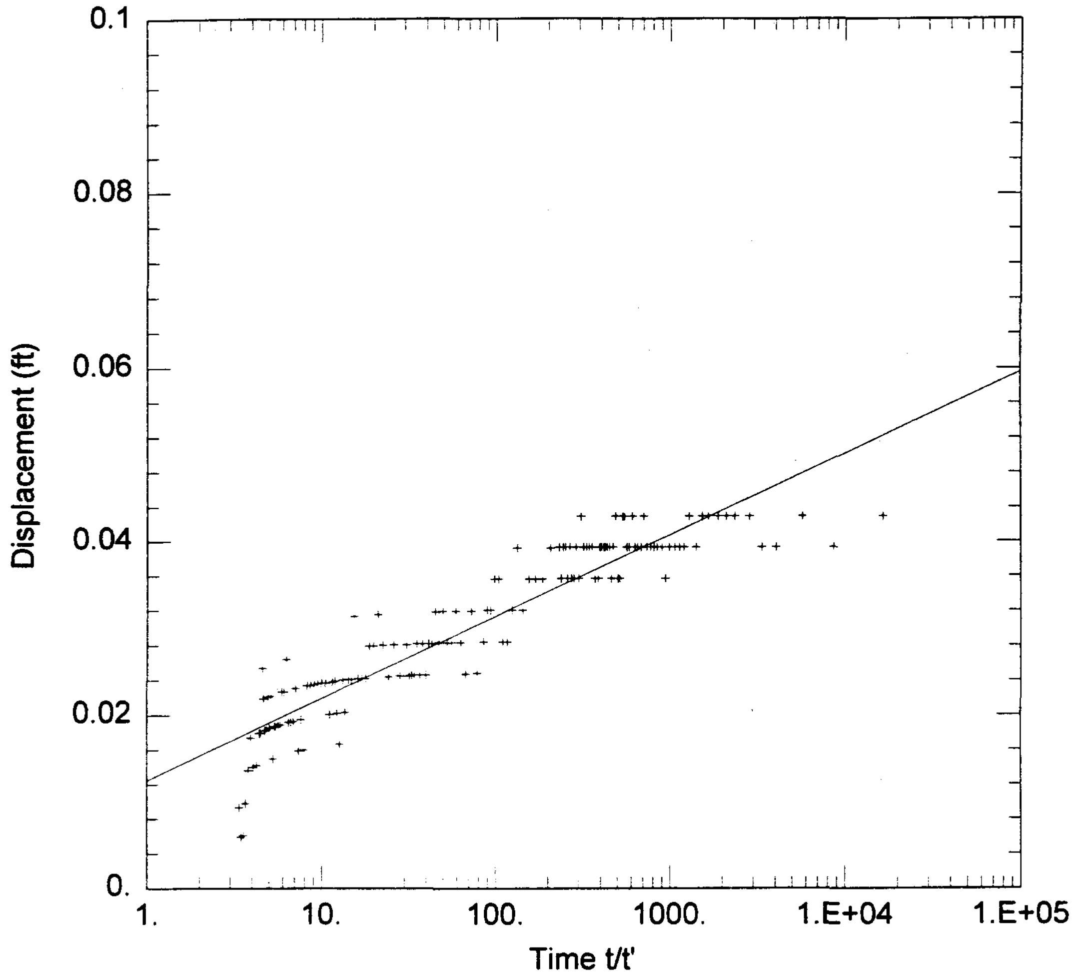
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03AA	12	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 4.776 ft^2/min
S = 0.1664



TEST E04, IR01P03AA RECOVERY (CORRECTED)

Data Set: G:\EPUMPT\E04OW1RD.AQT
Date: 02/14/97 Time: 11:58:03

AQUIFER DATA

Saturated Thickness: 11.04 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

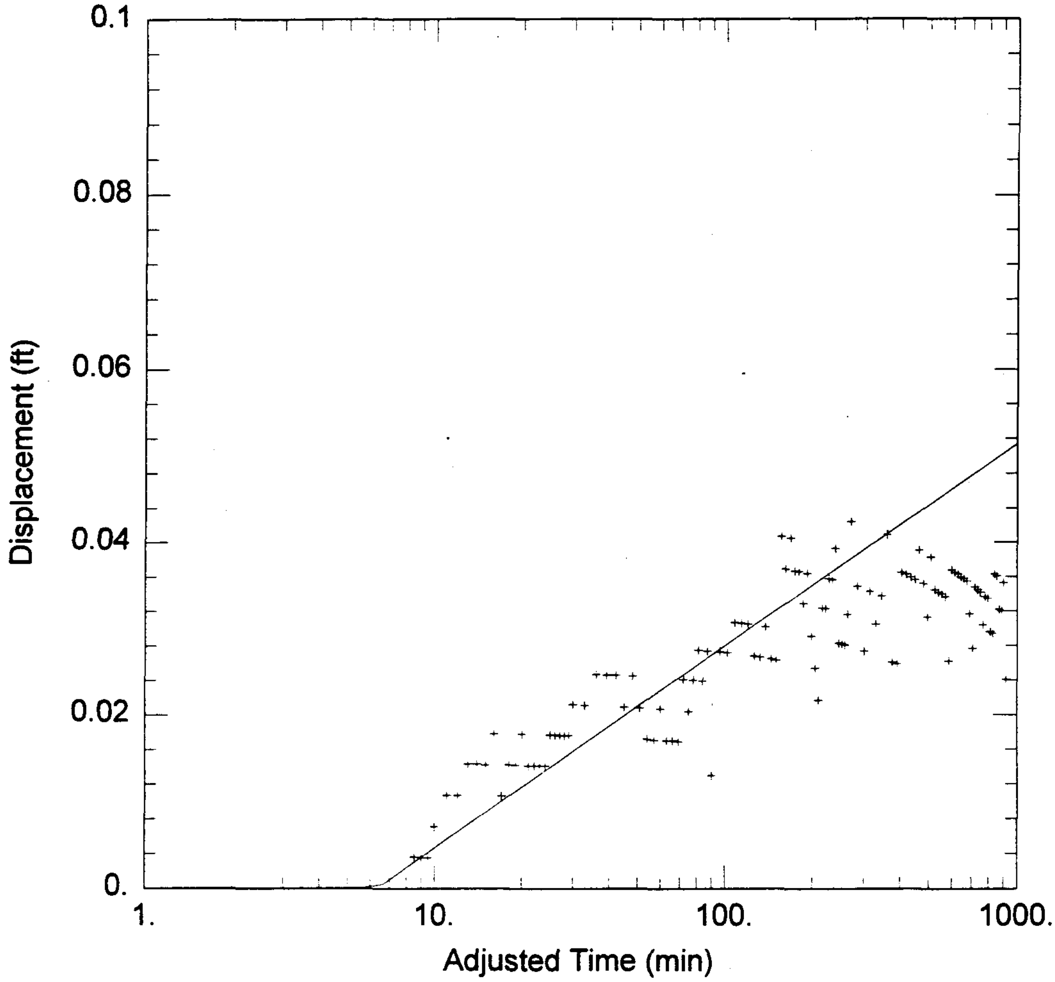
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03AA	12	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 11.06 ft^2/min
S' = 0.0468



TEST E04, WELL IR01P03AB (CORRECTED)

Data Set: G:\EPUMPT\E04OW2DD.AQT
Date: 02/14/97 Time: 16:35:31

AQUIFER DATA

Saturated Thickness: 12.19 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

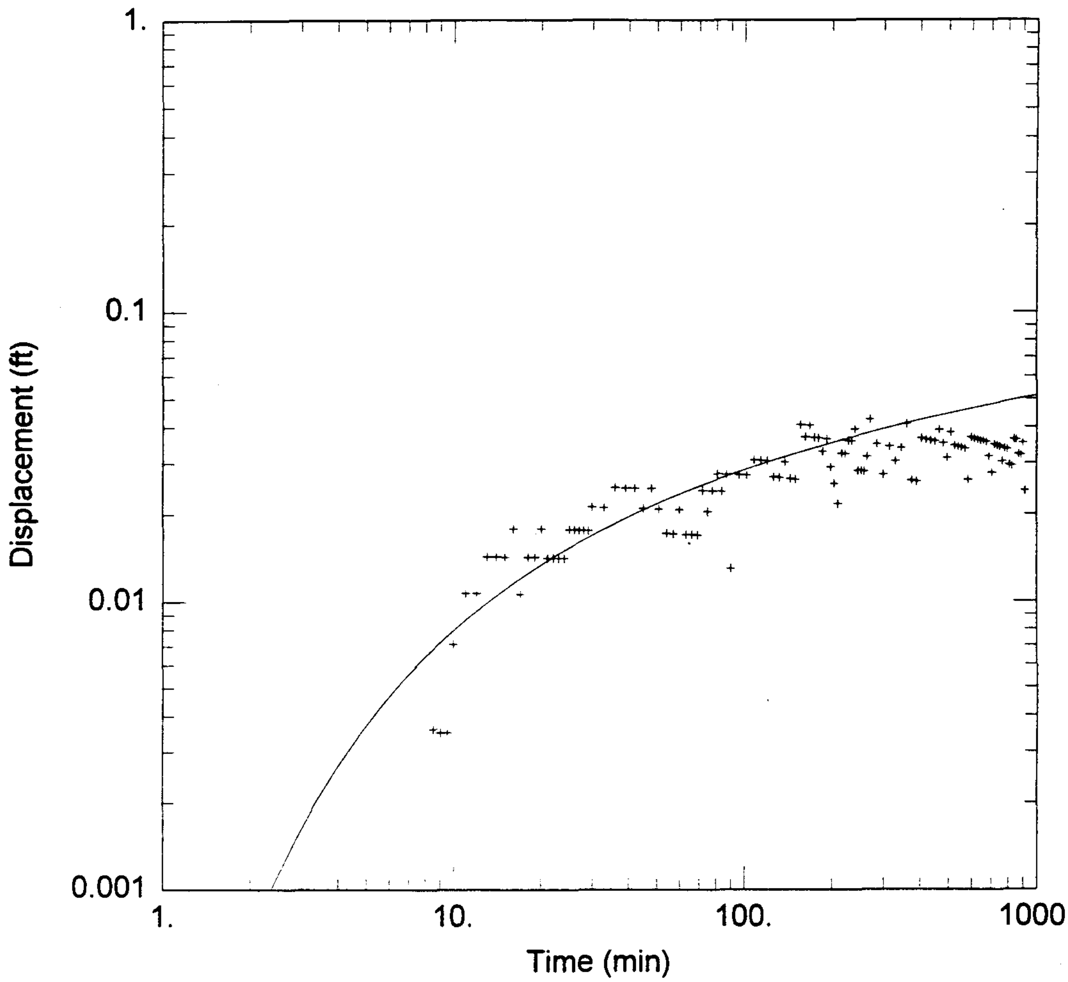
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03AB	21.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 4.451 ft^2/min
S = 0.1374



TEST E04, WELL IR01P03AB (CORRECTED)

Data Set: G:\EPUMPT\E04OW2DD.AQT
Date: 02/14/97 Time: 16:14:28

AQUIFER DATA

Saturated Thickness: 12.19 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

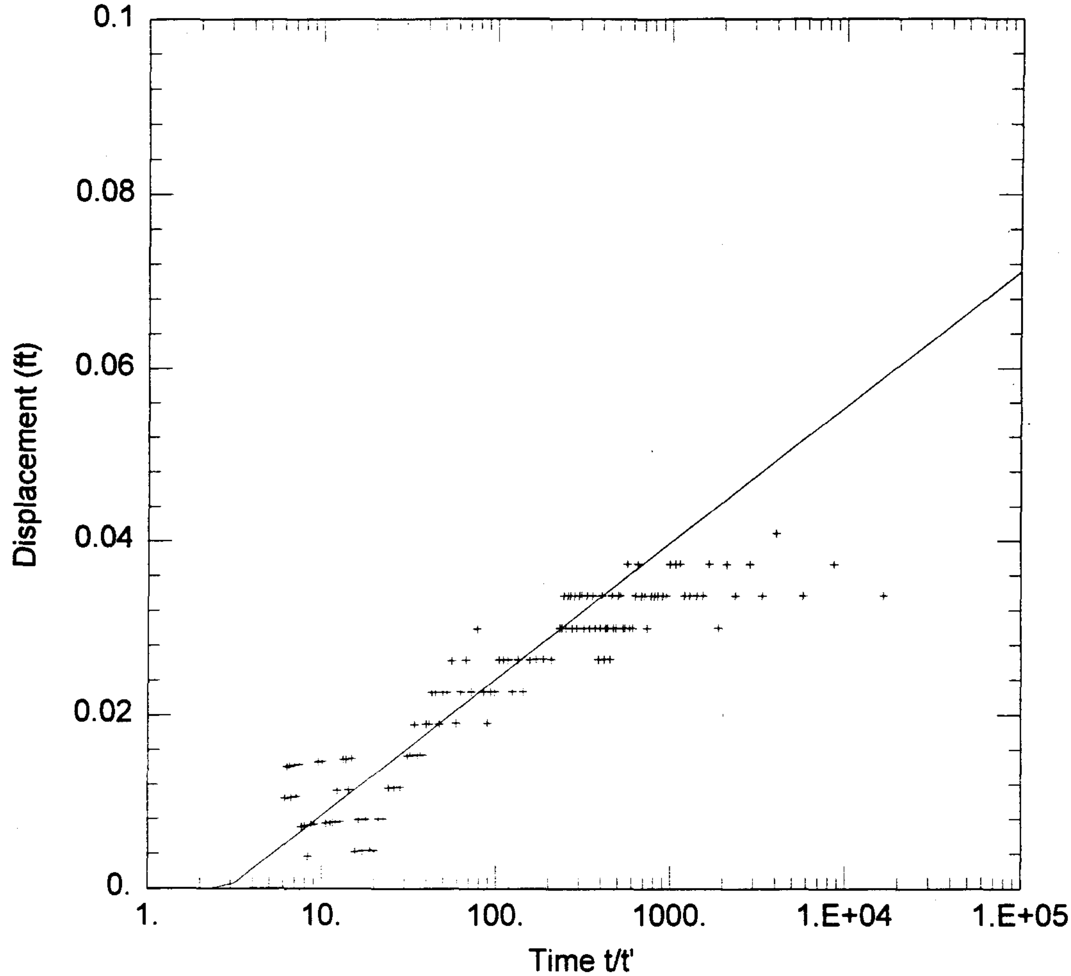
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03AB	21.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 4.451 ft^2/min
S = 0.1374



TEST E04, IR01P03AB RECOVERY (CORRECTED)

Data Set: G:\EPUMPT\E04OW2RD.AQT
Date: 02/14/97 Time: 13:24:47

AQUIFER DATA

Saturated Thickness: 12.19 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR01MW03A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
+ IR01P03AB	21.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 6.642 ft^2/min
S' = 2.894

C2-B

MATCHING CURVE AND
ESTIMATED HYDRAULIC PROPERTIES
FOR
CONSTANT-RATE PUMPING TEST 2

PRELIMINARY DRAFT

Calculation Sheet - Well IR01MW53B

PUMPED WELL: IR01MW53B

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 10.5 gpm = 2,020 ft^3/day

b Saturated thickness = 11 ft

Δs Change in residual drawdown = 2.4 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (2{,}020)\ /\ 4\ \pi\ (2.4)$

$T = 150$ ft^2/day

HYDRAULIC CONDUCTIVITY (K):

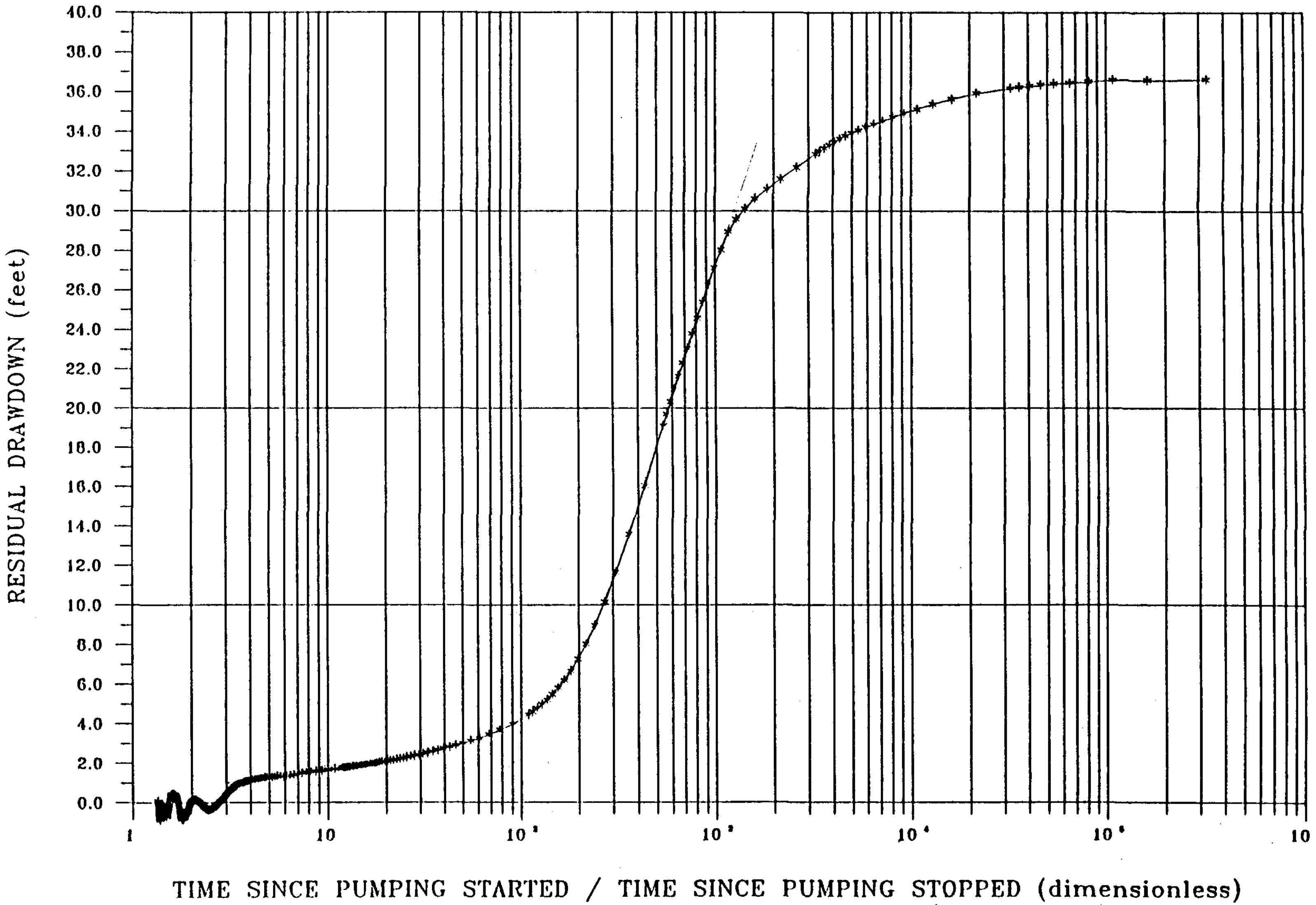
$K = T / b$

$K = (150) / (11)$

K =14 ft/day

PRELIMINARY DRAFT

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR01MW53B
CONSTANT RATE DISCHARGE TEST OF WELL IR01MW53B
HUNTERS POINT ANNEX SITE IR-1



C2-C

MATCHING CURVE AND
ESTIMATED HYDRAULIC PROPERTIES
FOR
CONSTANT-RATE PUMPING TEST 3

Calculation Sheet - Well IR01MW58A

PUMPED WELL: IR01MW58A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 5.5 gpm = 1,060 ft^3/day

b Saturated thickness = 11.9 ft

Δs Change in residual drawdown =0.20 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (1{,}060)\ /\ 4\ \pi\ (0.2)$

T = 970 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

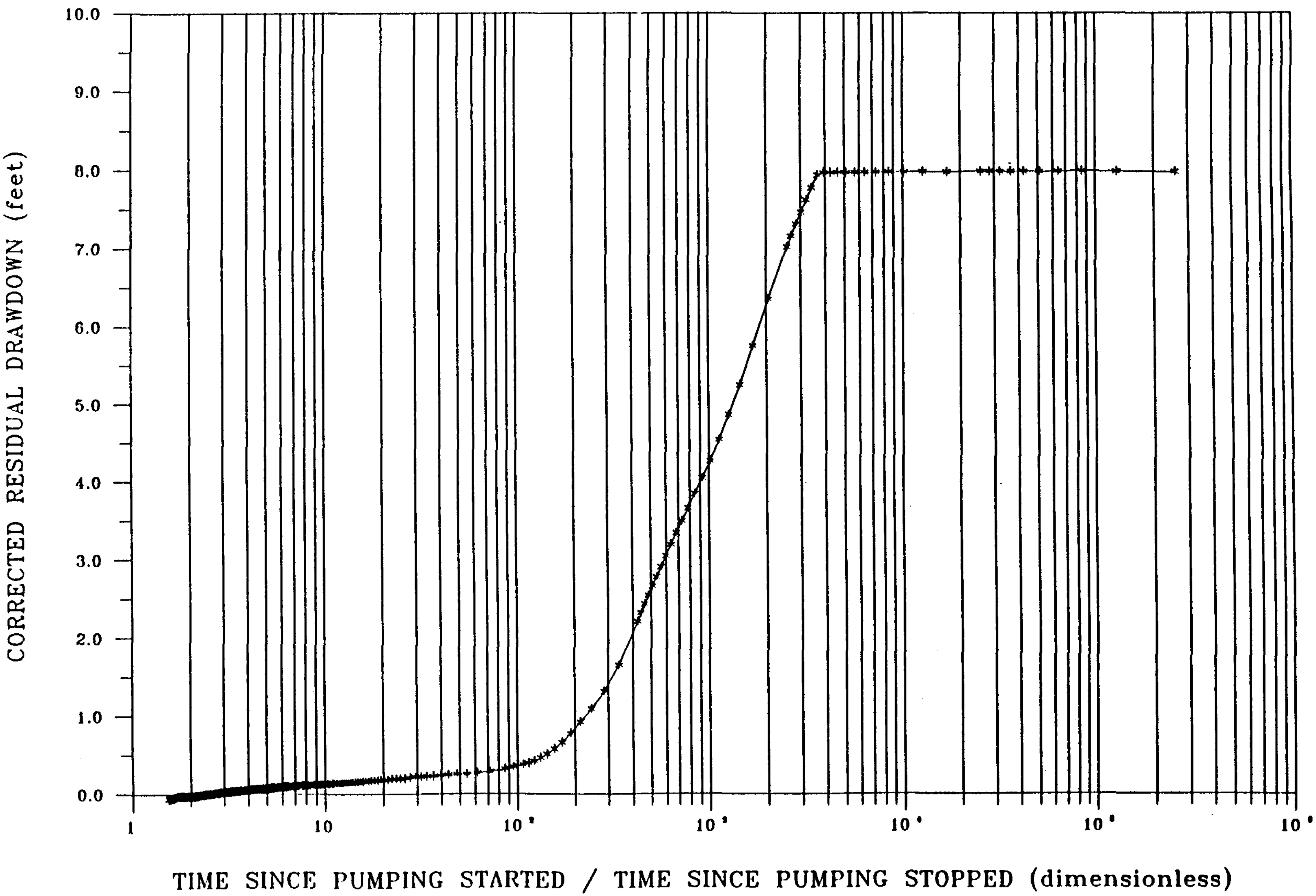
$K = T / b$

$K = (970) / (11.9)$

K =80 ft/day

PRELIMINARY DRAFT

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR01MW58A
CONSTANT RATE DISCHARGE TEST OF WELL IR01MW58A
HUNTERS POINT ANNEX SITE IR-1



C2-D

MATCHING CURVE AND ESTIMATED HYDRAULIC PROPERTIES FOR CONSTANT-RATE PUMPING TEST 4

PRELIMINARY DRAFT

Calculation Sheet - Well IR02MW93A

OBSERVATION WELL: IR02MW93A

PUMPED WELL: IR02MW93A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 6.5 gpm = 1,250 ft^3/day

b Saturated thickness = 11.2 ft

Δs Change in residual drawdown = 0.044 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (1{,}250) / 4\ \pi\ (0.044)$

T = 5,200 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

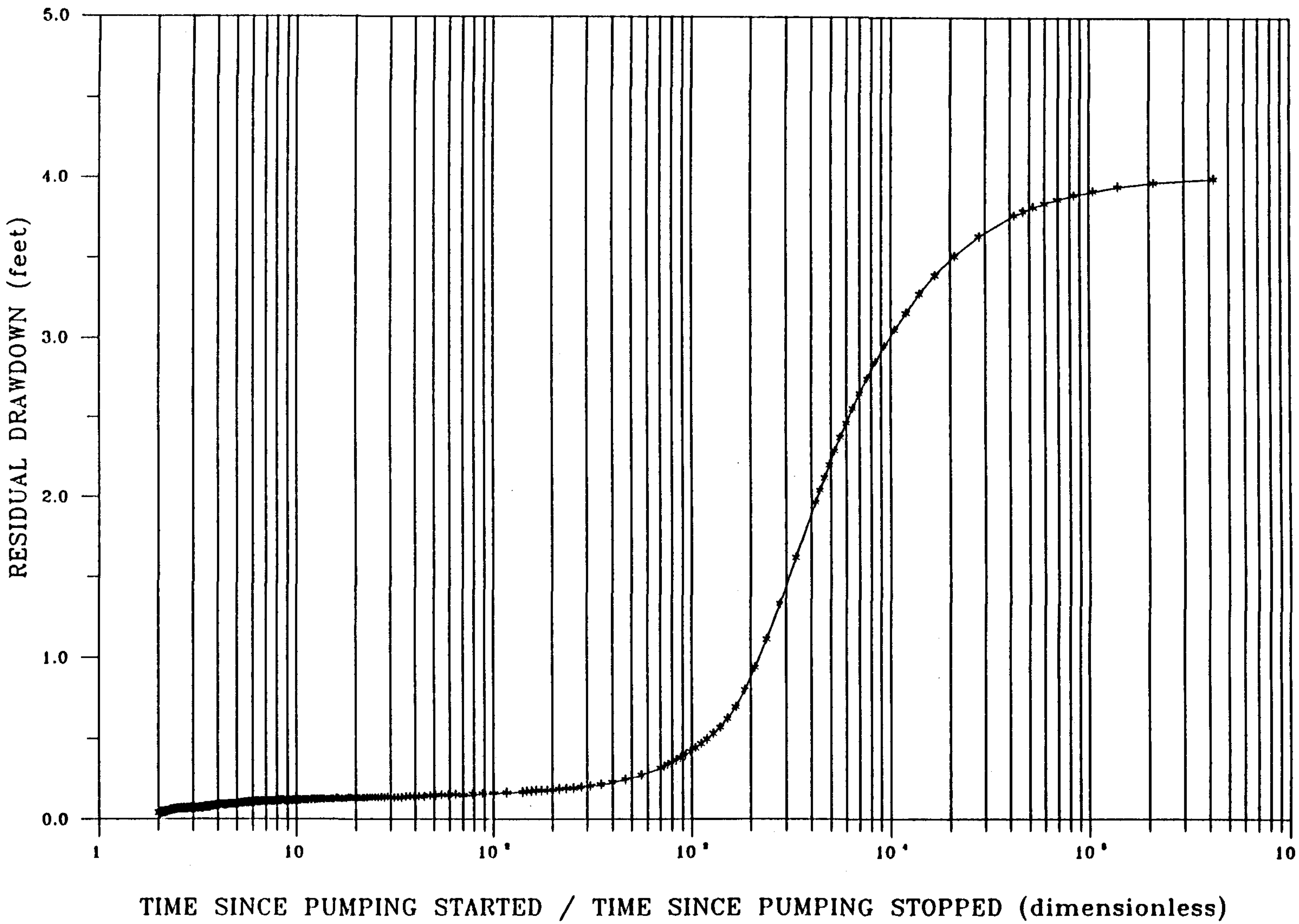
$K = T / b$

$K = (5{,}200) / (11.2)$

K = 460 ft/day

PRELIMINARY DRAFT

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR02MW93A
CONSTANT RATE DISCHARGE TEST OF WELL IR02MW93A
HUNTERS POINT ANNEX SITE IR-2



Calculation Sheet - Well IR02P93AA

OBSERVATION WELL IR02P93AA

PUMPED WELL: IR01MW93A

TYPE OF DATA: Drawdown early time

ANALYSIS METHOD: Unconfined Aquifer with Delayed Yield (Neuman, 1975)

Equation Parameters:

Q Constant Discharge rate = 6.5 gpm = 1,250 ft^3/day

r Radius from pumped well = 12.0 ft

b Saturated thickness = 11.1 ft

Early time type curve match point:

$U_a = 0.13$ $W(U_a B) = 28.8$ $B = 0.001$

Drawdown (s) = 1 ft Time (t) = 10 min

TRANSMISSIVITY (T):

$T = Q\,W(U_a B)\ /\ 4\ \pi\ s$

$T = (1{,}250)\ (28.8)\ /\ 4\ \pi\ (1)$

$T = 2{,}900$ ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (2.900) / (11.1)$

$K = 260$ ft/day

STORATIVITY (S):

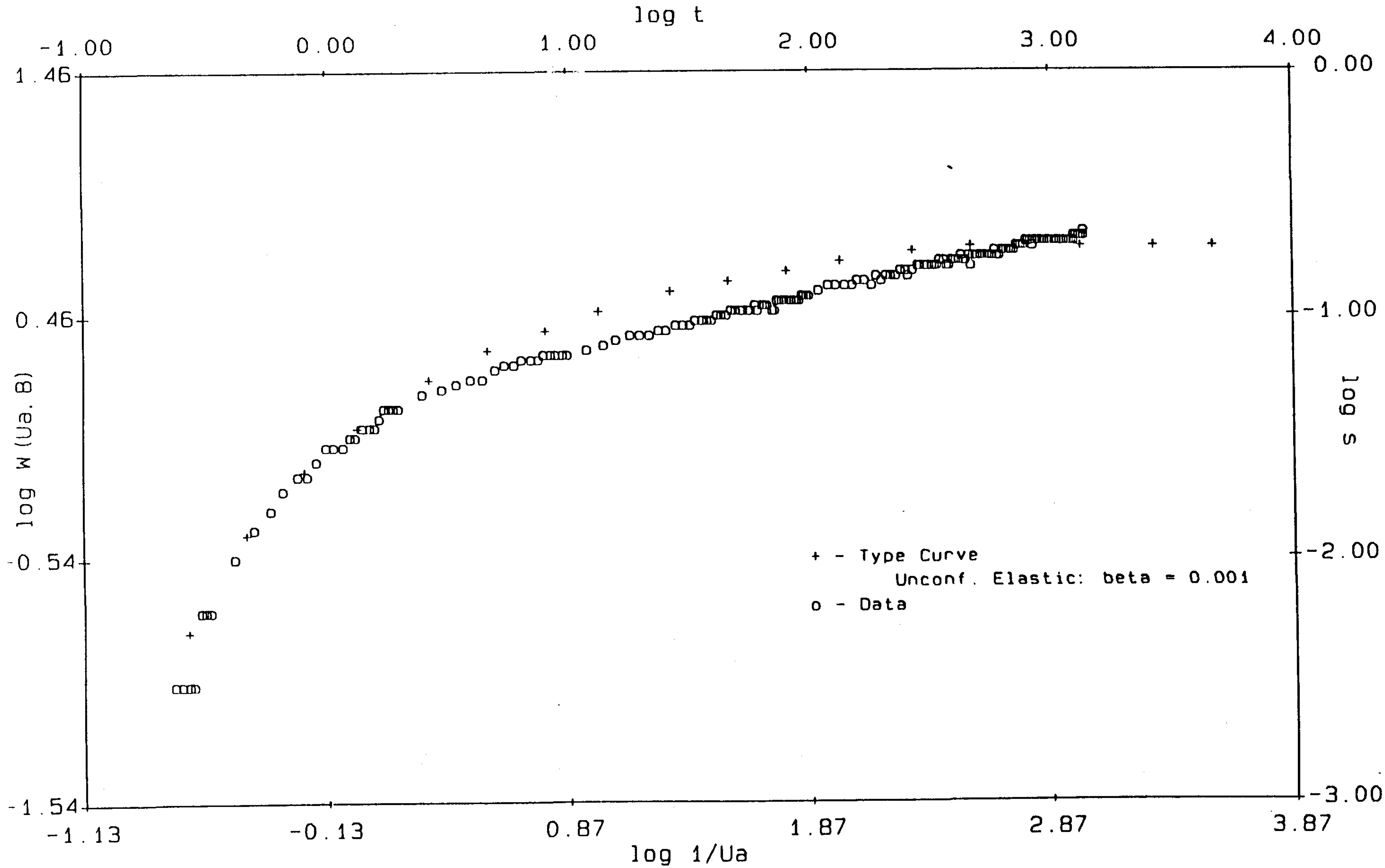
$S_s = U_a\ T\ t / r^2$

$S_s = (0.13)\ (2{,}900)\ (10)\ /\ (1{,}440\ ^{min}/day)\ (12.0)^2$

$S_s = 0.018$

PRELIMINARY DRAFT

WELL IR02P93AA



PRELIMINARY DRAFT

Calculation Sheet - Well IR02P93AA

OBSERVATION WELL:	IR02P93AA
PUMPED WELL:	IR02MW93A
TYPE OF DATA:	Residual drawdown
ANALYSIS METHOD:	Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 6.5 gpm = 1,250 ft^3/day

b Saturated thickness = 11.1 ft

Δs Change in residual drawdown = 0.04 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (1{,}250) / 4\ \pi\ (0.04)$

T = 5,700 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

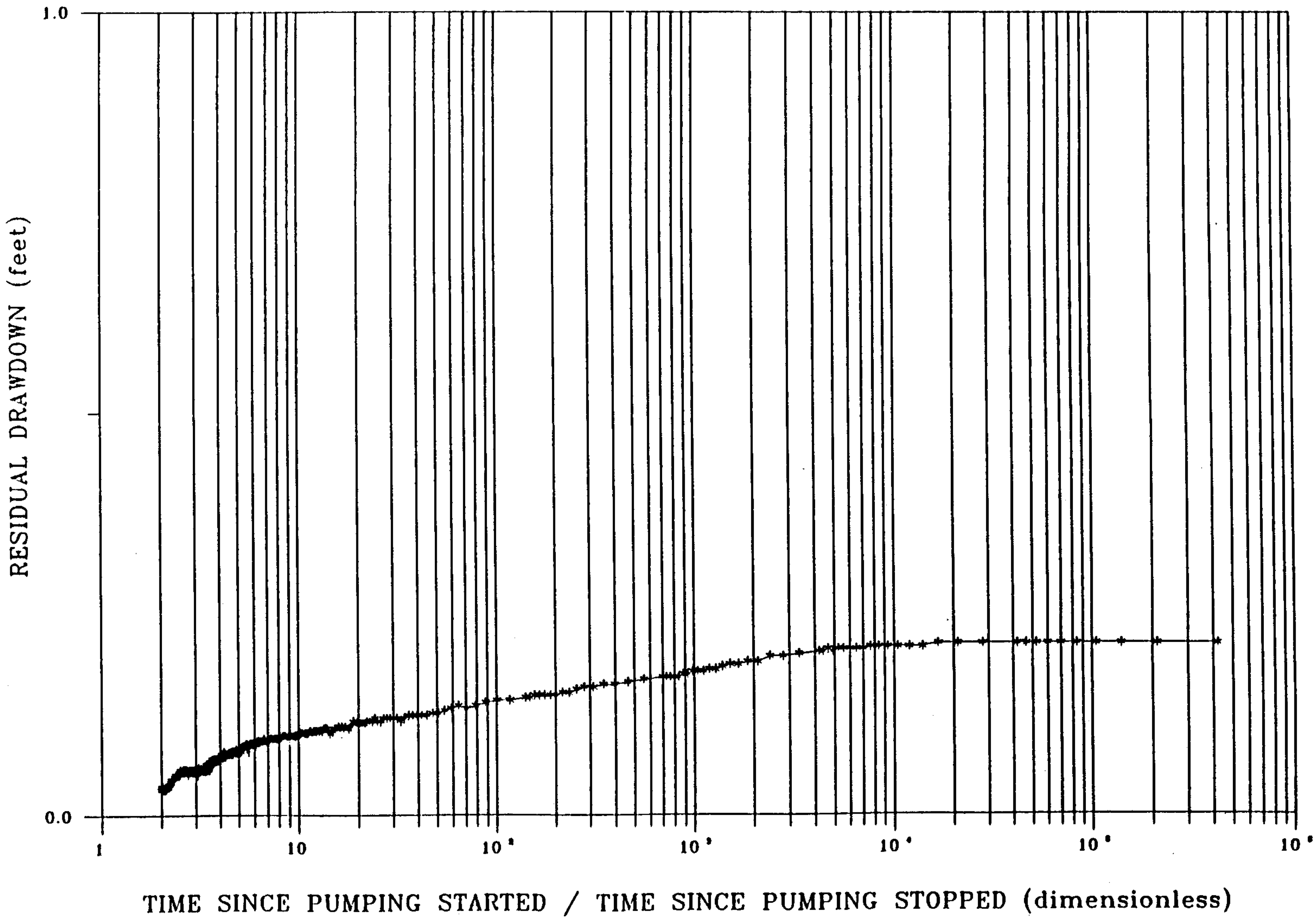
$K = T / b$

$K = (5{,}700) / (11.1)$

K = 510 ft/day

PRELIMINARY DRAFT

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR02P93AA
CONSTANT RATE DISCHARGE TEST OF WELL IR02MW93A
HUNTERS POINT ANNEX SITE IR-2



PRELIMINARY DRAFT

Calculation Sheet - Well IR02P93AB

OBSERVATION WELL	IR02P93AB
PUMPED WELL:	IR02MW93A
TYPE OF DATA:	Drawdown early time
ANALYSIS METHOD:	Unconfined Aquifer with Delayed Yield (Neuman, 1975)

Equation Parameters:

Q   Constant Discharge rate = 6.5 gpm = 1,250 ft^3/day

r   Radius from pumped well = 39.0 ft

b   Saturated thickness = 11.2 ft

Early time type curve match point:

U_a = 0.36 $W(U_aB)$ = 25.1   B = 0.001

Drawdown (s) = 1 ft   Time (t) = 10 min

TRANSMISSIVITY (T):

$T = Q\ W(U_aB)\ /\ 4\ \pi\ s$

$T = (1{,}250)\ (25.1)\ /\ 4\ \pi\ (1)$

T = 2,500 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T\ /\ b$

$K = (2.500)\ /\ (11.2)$

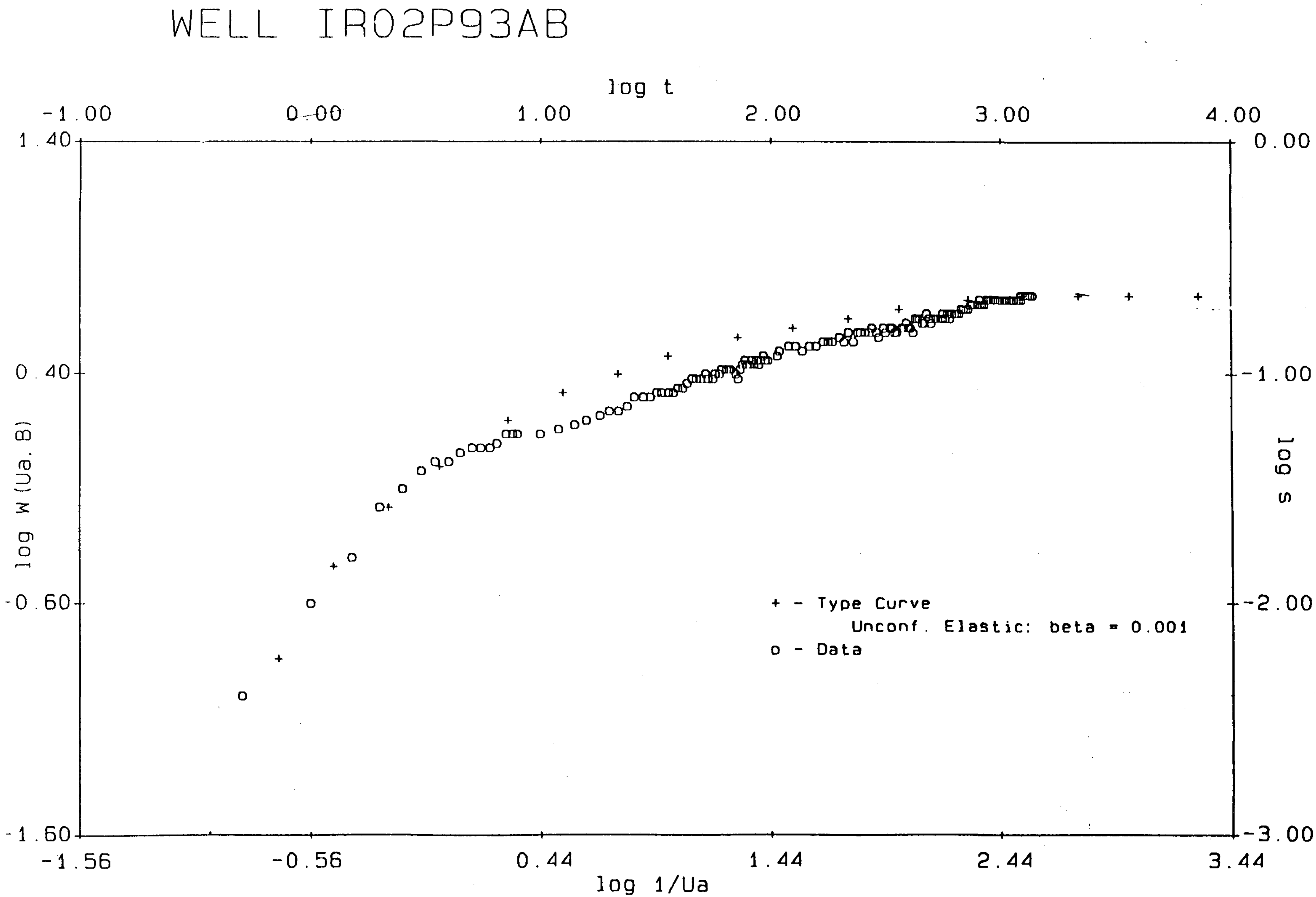
K = 220 ft/day

STORATIVITY (S):

$S_s = U_a\ T\ t\ /\ r^2$

$S_s = (0.36)\ (2{,}500)\ (10)\ /\ (1{,}440\ ^{min}/day)\ (39.0)^2$

$S_s = 0.0041$


WELL IR02P93AB
log t
-1.00
0.00
1.00
2.00
3.00
4.00
1.40
0.40
-0.60
-1.60
0.00
-1.00
-2.00
-3.00
log W(Ua,B)
log s
-1.56
-0.56
0.44
1.44
2.44
3.44
log 1/Ua
+ - Type Curve
Unconf. Elastic: beta = 0.001
o - Data

PRELIMINARY DRAFT

Calculation Sheet - Well IR02P93AB

OBSERVATION WELL: IR02P93AB

PUMPED WELL: IR02MW93A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 6.5 gpm = 1,250 ft^3/day

b Saturated thickness = 11.2 ft

Δs Change in residual drawdown = 0.05 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (1{,}250) / 4\ \pi\ (0.05)$

$T = 4{,}600$ ft^2/day

HYDRAULIC CONDUCTIVITY (K):

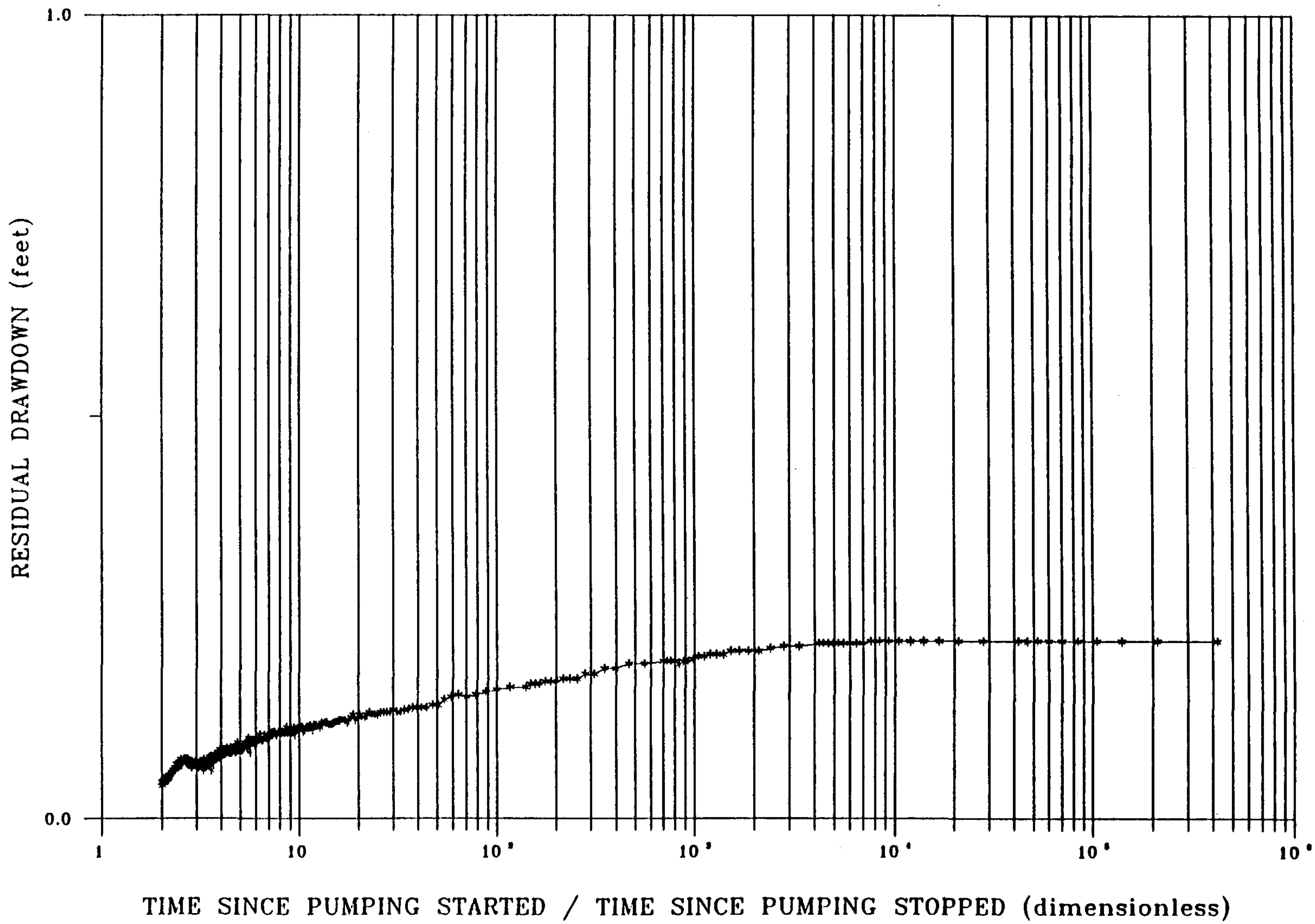
$K = T / b$

$K = (4{,}600) / (11.2)$

$K = 410$ ft/day

PRELIMINARY DRAFT

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR02P93AB
CONSTANT RATE DISCHARGE TEST OF WELL IR02MW93A
HUNTERS POINT ANNEX SITE IR-2



C2-E

MATCHING CURVE AND
ESTIMATE HYDRAULIC PROPERTIES
FOR
CONSTANT-RATE PUPING TEST 5

PRELIMINARY DRAFT

Calculation Sheet - Well IR02MW126A

PUMPED WELL: IR02MW126A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 3.2 gpm = 616 ft^3/day

b Saturated thickness = 6.9 ft

Δs Change in residual drawdown = 0.19 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\,Q / 4\pi\Delta s$

$T = 2.3\,(616) / 4\pi\,(0.19)$

T = 590 ft^2/day

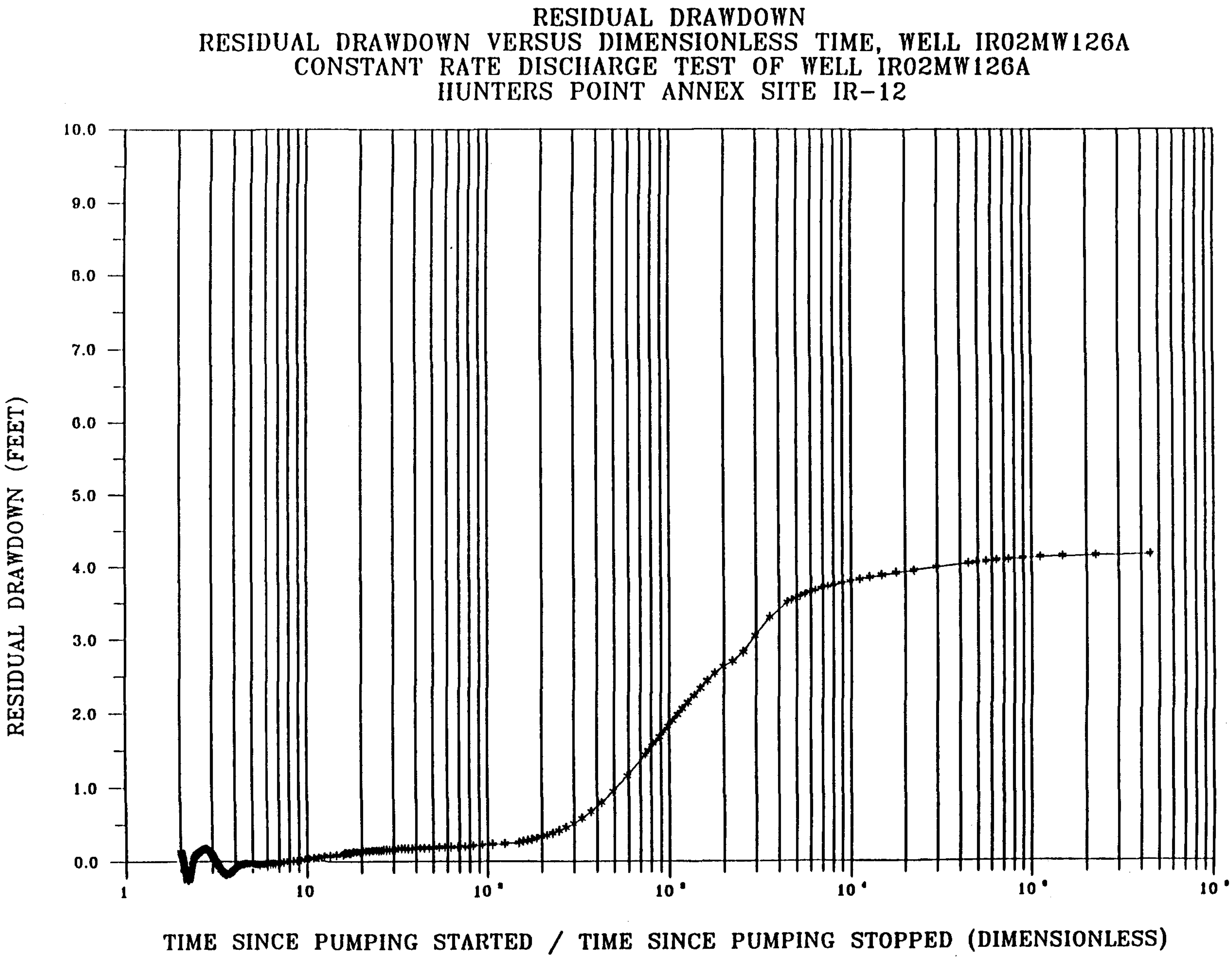
HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (590) / (6.9)$

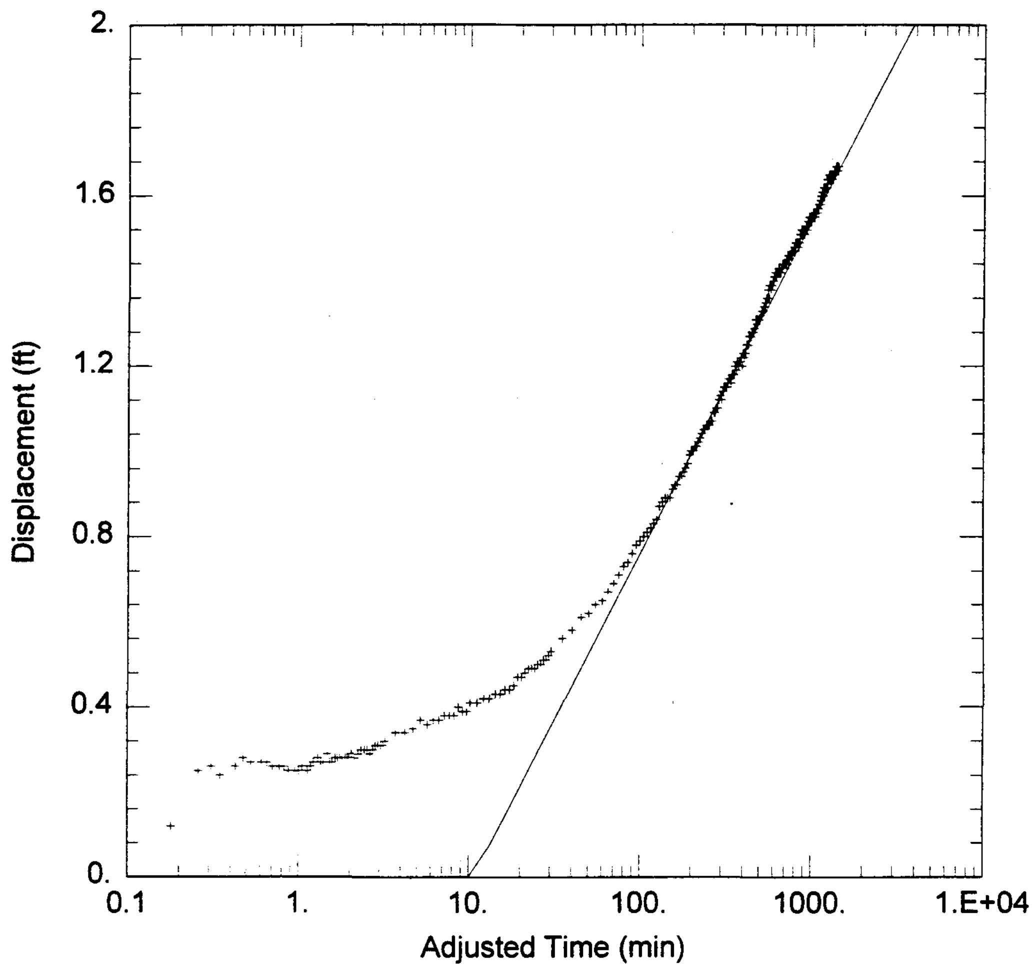
K = 86 ft/day

PRELIMINARY DRAFT



C2-F

MATCHING CURVE AND
ESTIMATED HYDRAULIC PROPERTIES
FOR
CONSTANT-RATE PUMPING TEST 6



TEST E01, PUMPING WELL IR04MW31A

Data Set: G:\EPUMP\E01PW.AQT
Date: 02/07/97 Time: 15:11:57

AQUIFER DATA

Saturated Thickness: 14.87 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

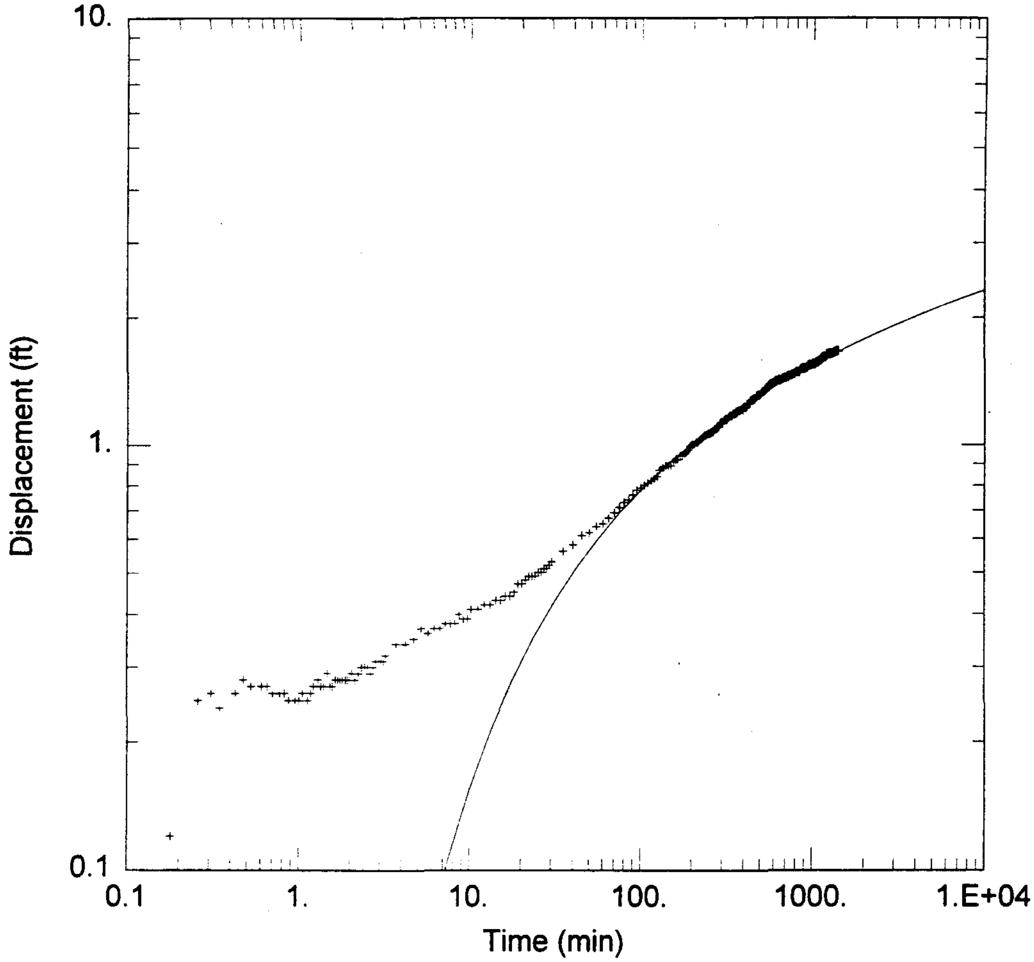
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04MW31A	1	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.0469 ft^2/min
S = 1.127



TEST E01, PUMPING WELL IR04MW31A

Data Set: G:\EPUMP\E01PW.AQT
Date: 02/07/97 Time: 15:10:46

AQUIFER DATA

Saturated Thickness: 14.87 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

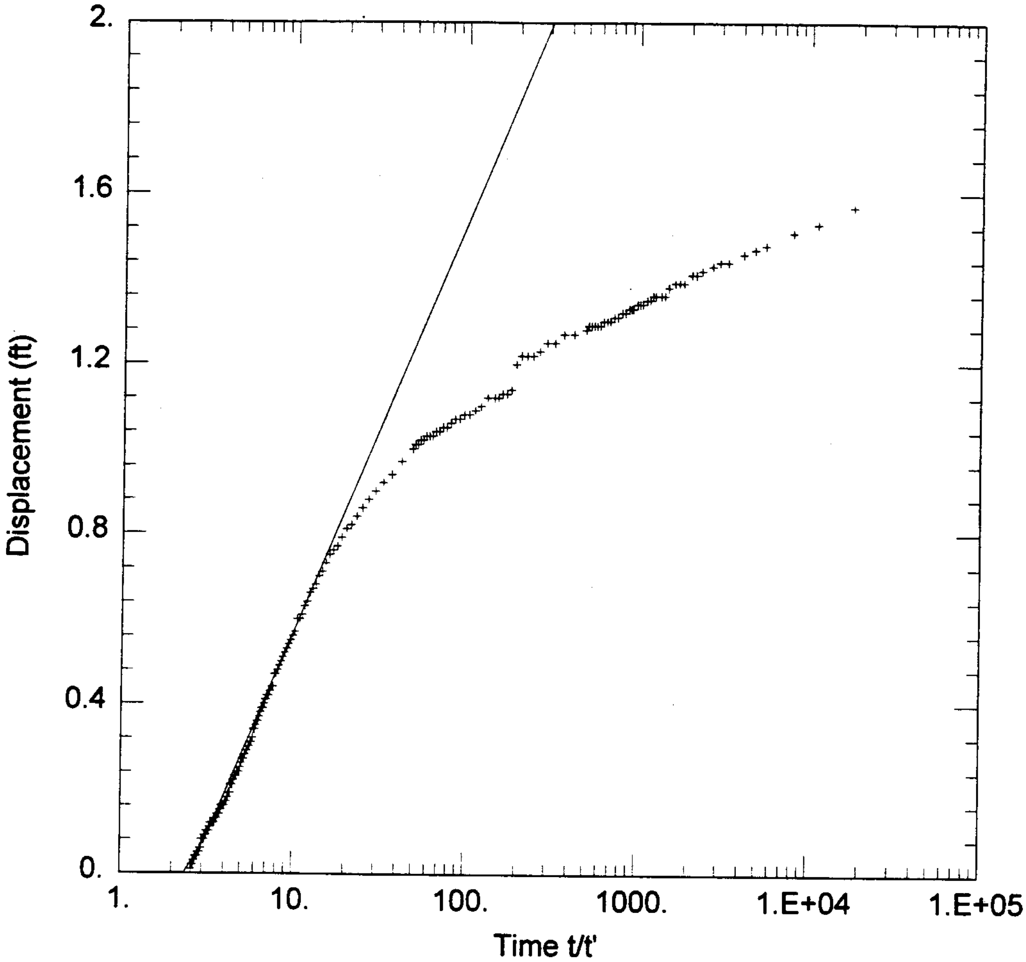
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04MW31A	1	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0469 ft^2/min
S = 1.127



TEST EO1, WELL IR04MW31A RECOVERY

Data Set: G:\EPUMP\E01PWRD.AQT
Date: 02/12/97 Time: 09:36:56

AQUIFER DATA

Saturated Thickness: 14.87 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

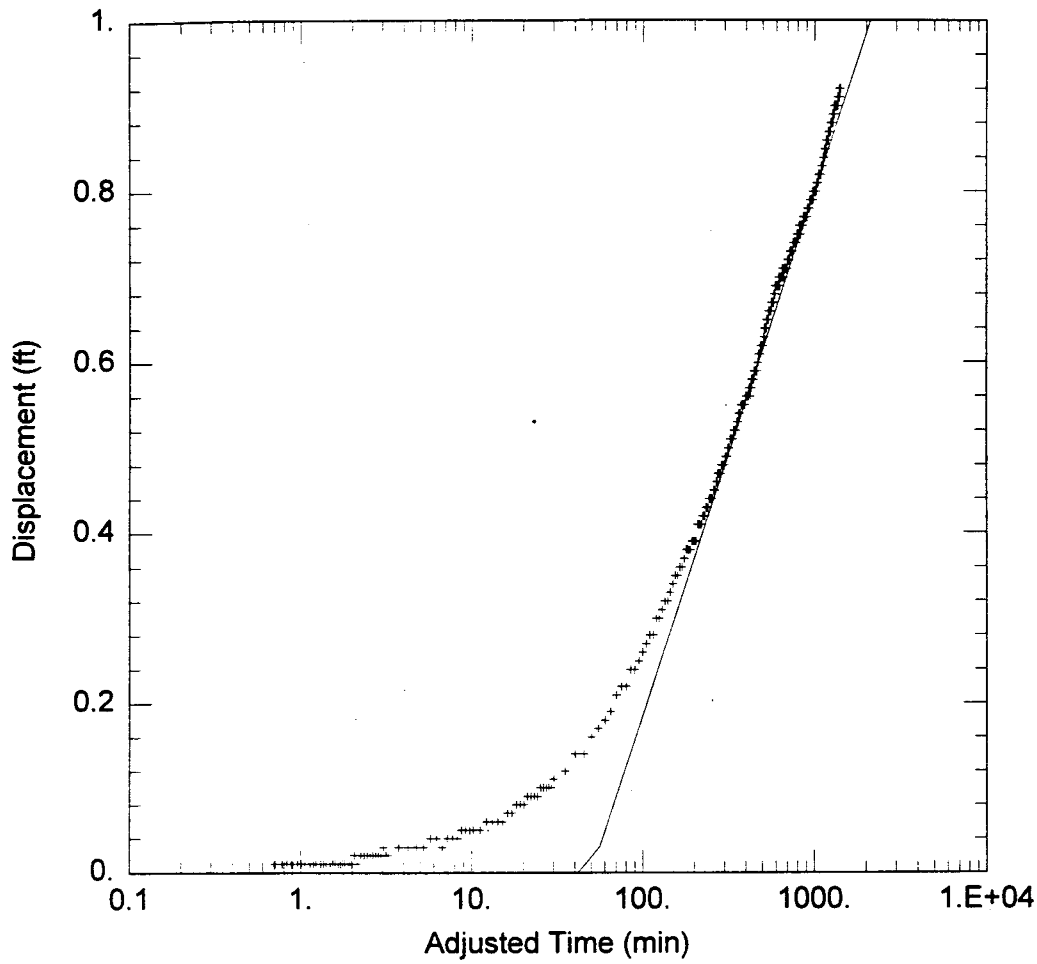
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04MW31A	1	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.03806 ft^2/min
S' = 2.585



TEST E01, OBSERVATION WELL IR04P31AA

Data Set: G:\EPUMP\E01OW1.AQT
Date: 02/07/97 Time: 14:14:38

AQUIFER DATA

Saturated Thickness: 14.87 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

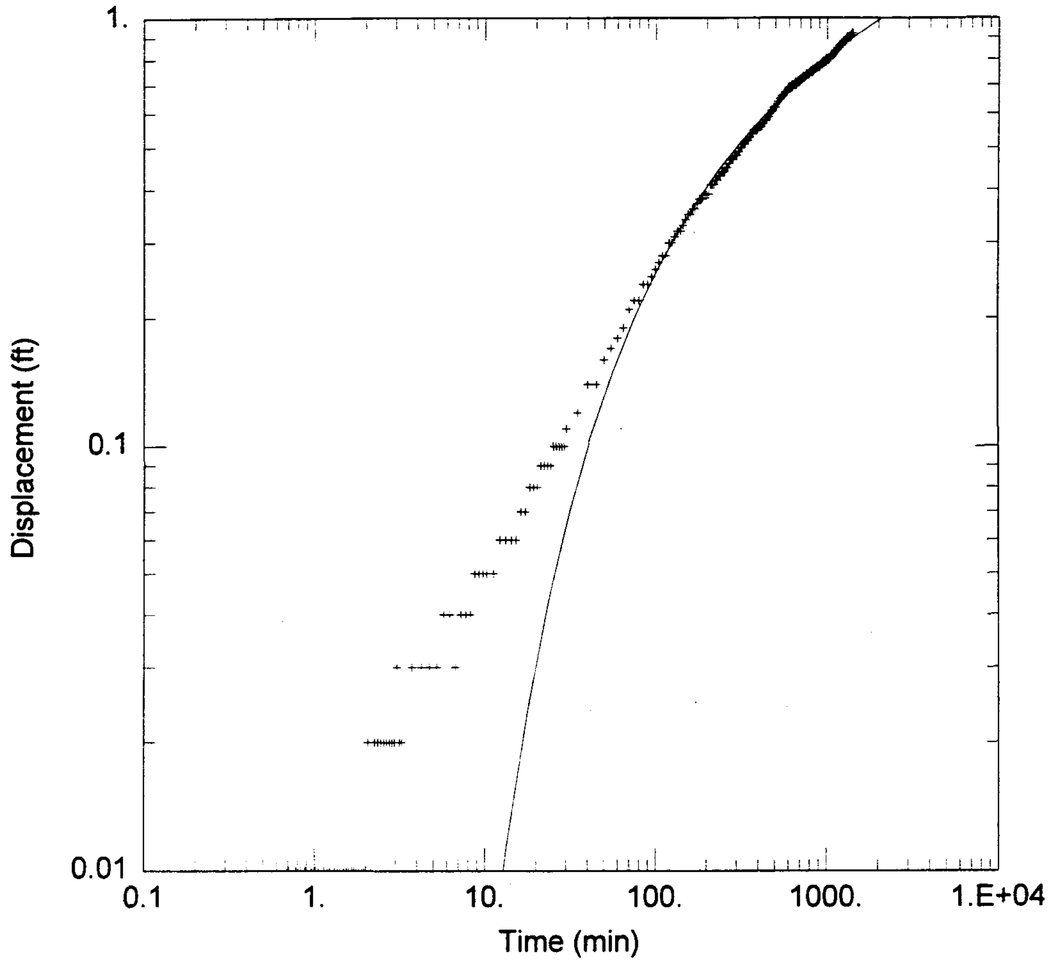
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04P31AA	11.6	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.05956 ft^2/min
S = 0.04988



TEST E01, OBSERVATION WELL IR04P31AA

Data Set: G:\EPUMP\E01OW1.AQT
Date: 02/07/97 Time: 14:22:53

AQUIFER DATA

Saturated Thickness: 14.87 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

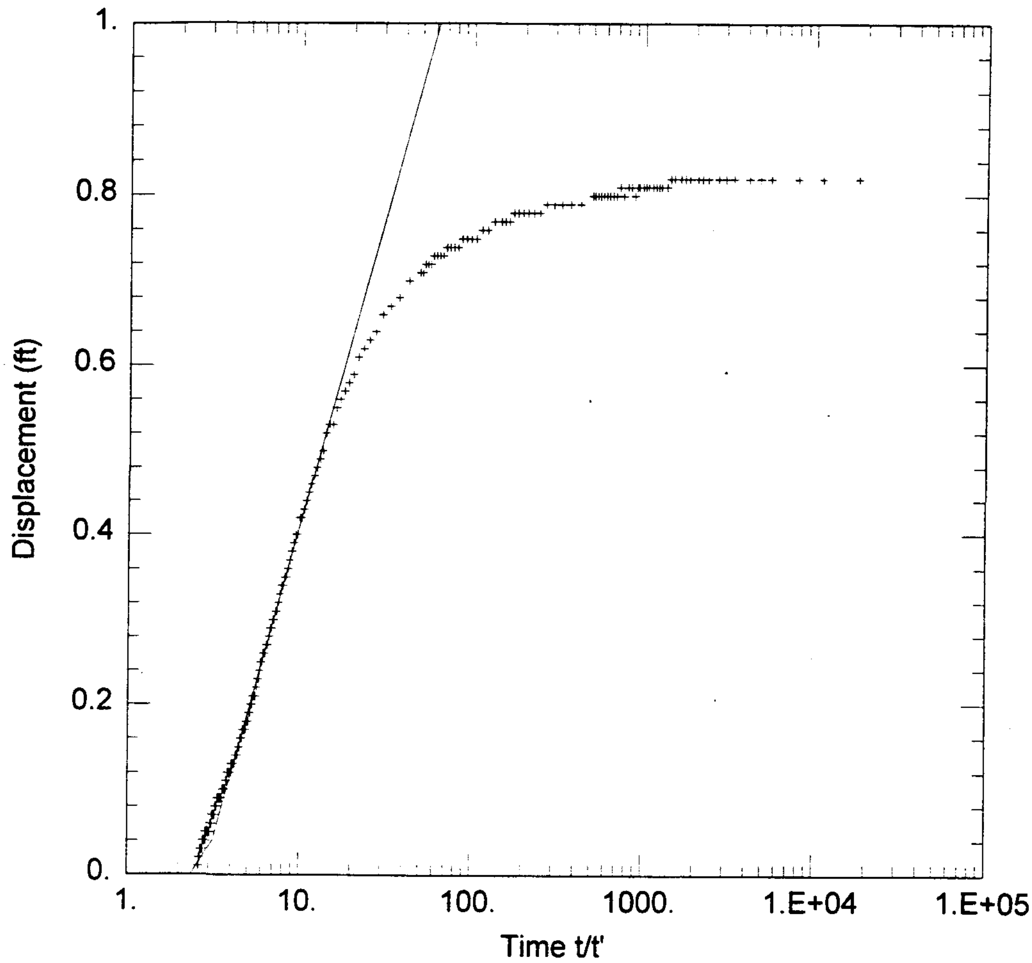
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04P31AA	11.6	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.05956 ft^2/min
S = 0.04988



TEST E01, WELL IR04P31AA, RECOVERY DATA

Data Set: G:\EPUMP\E01OW1RD.AQT
Date: 02/07/97 Time: 14:37:53

AQUIFER DATA

Saturated Thickness: 14.87 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

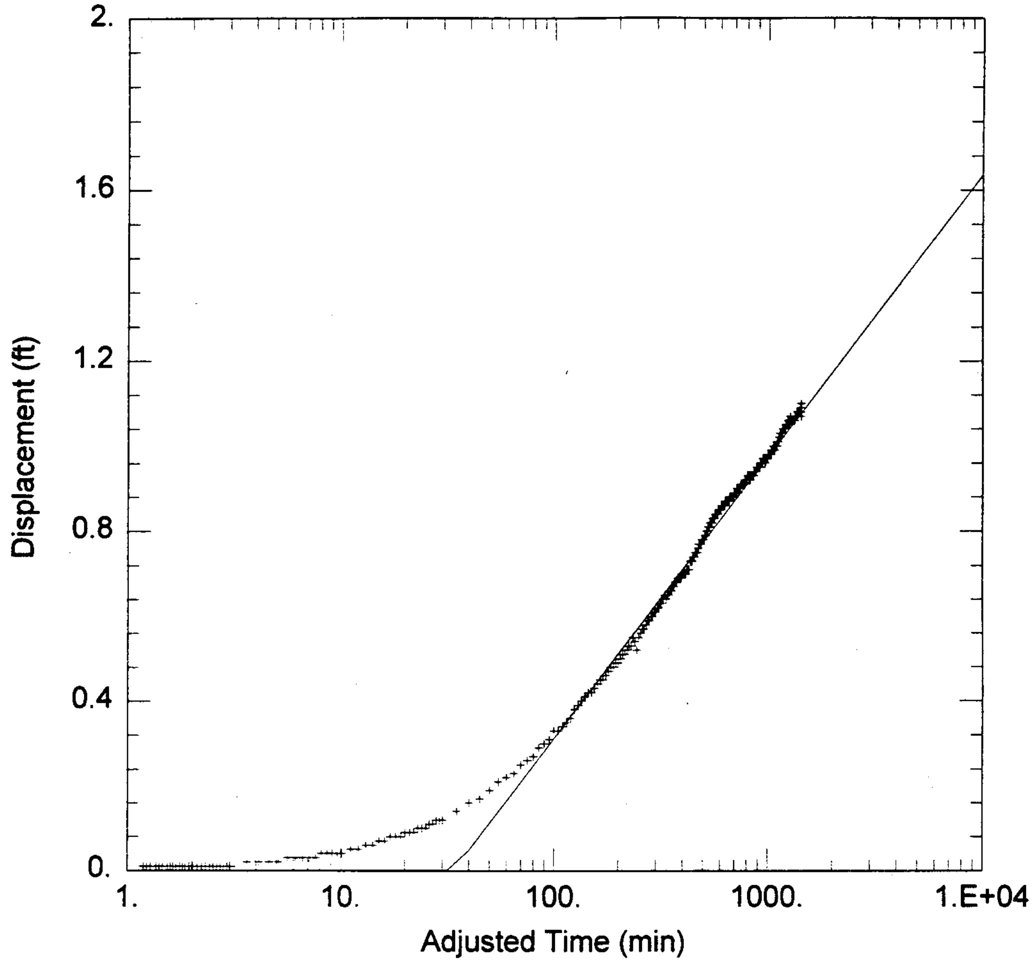
Observation Wells

Well Name	X (ft)	Y (ft)
IR04P31AA	11.6	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.04948 ft^2/min
S' = 2.788



TEST E01, WELL IR04P31AB

Data Set: G:\EPUMP\E01OW2DD.AQT
Date: 02/07/97 Time: 15:25:09

AQUIFER DATA

Saturated Thickness: 18.38 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

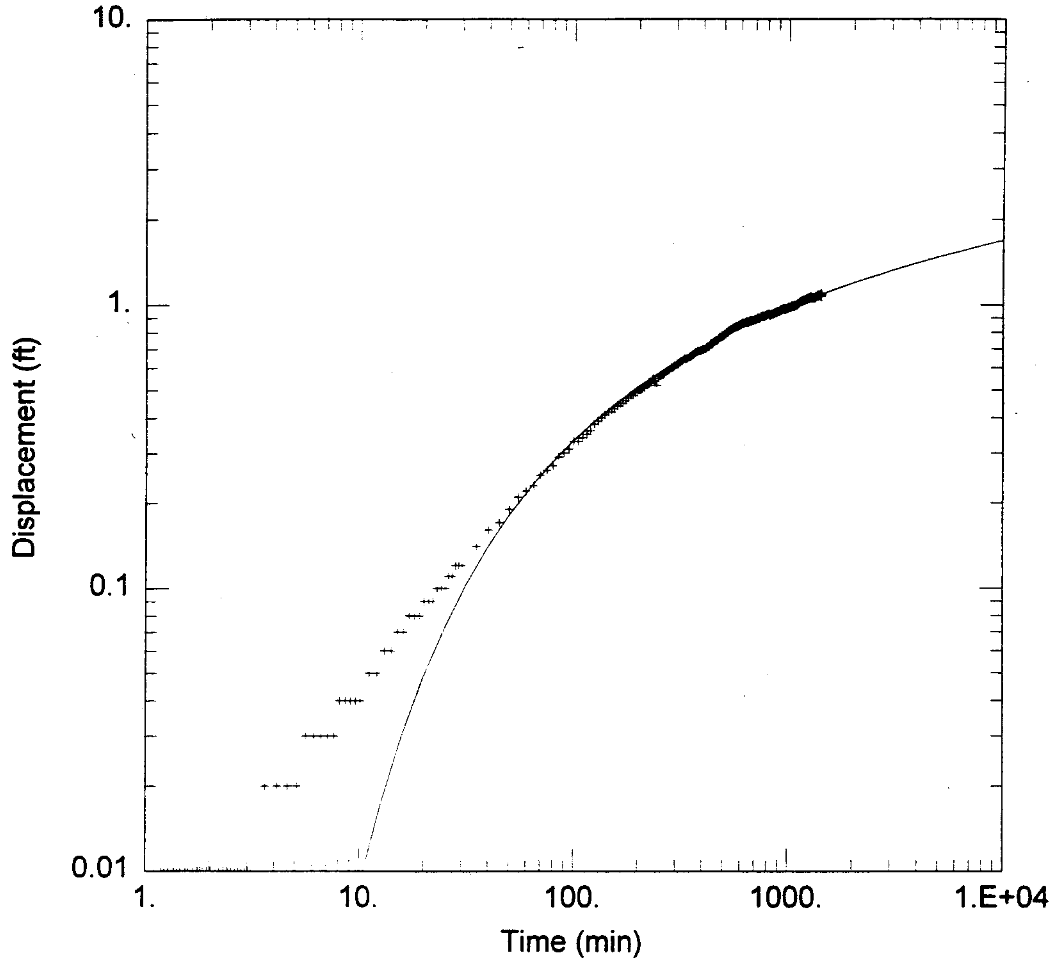
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04P31AB	36.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.05538 ft^2/min
S = 0.003129



TEST E01, WELL IR04P31AB

Data Set: G:\EPUMP\E01OW2DD.AQT
Date: 02/07/97 Time: 15:16:29

AQUIFER DATA

Saturated Thickness: 18.38 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

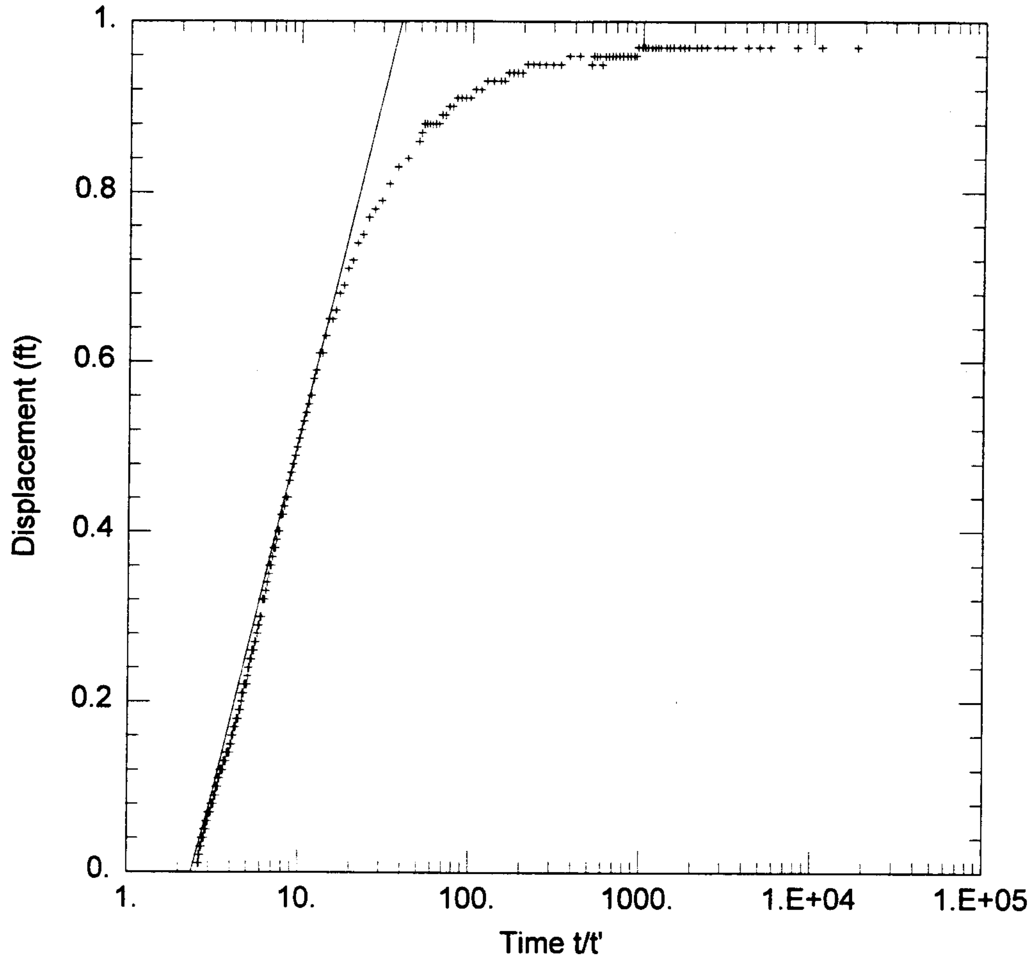
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04P31AB	36.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.05148 ft^2/min
S = 0.003678



TEST E01, WELL IR04P31AB, RECOVERY DATA

Data Set: G:\EPUMP\E01OW2RD.AQT
Date: 02/07/97 Time: 15:38:52

AQUIFER DATA

Saturated Thickness: 18.38 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR04MW31A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
+ IR04P31AB	36.7	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.0439 ft^2/min
S' = 2.441

C2-G

MATCHING CURVE AND ESTIMATE HYDRAULIC PROPERTIES FOR CONSTANT-RATE PUMPING TEST 7

PRELIMINARY DRAFT

Calculation Sheet - Well IR04MW38A

PUMPED WELL: IR04MW38A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 4.3 gpm = 828 ft^3/day

b Saturated thickness = 11.3 ft

Δs Change in residual drawdown = 0.04 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (828) / 4\ \pi\ (0.04)$

T = 3,800 ft^2/day

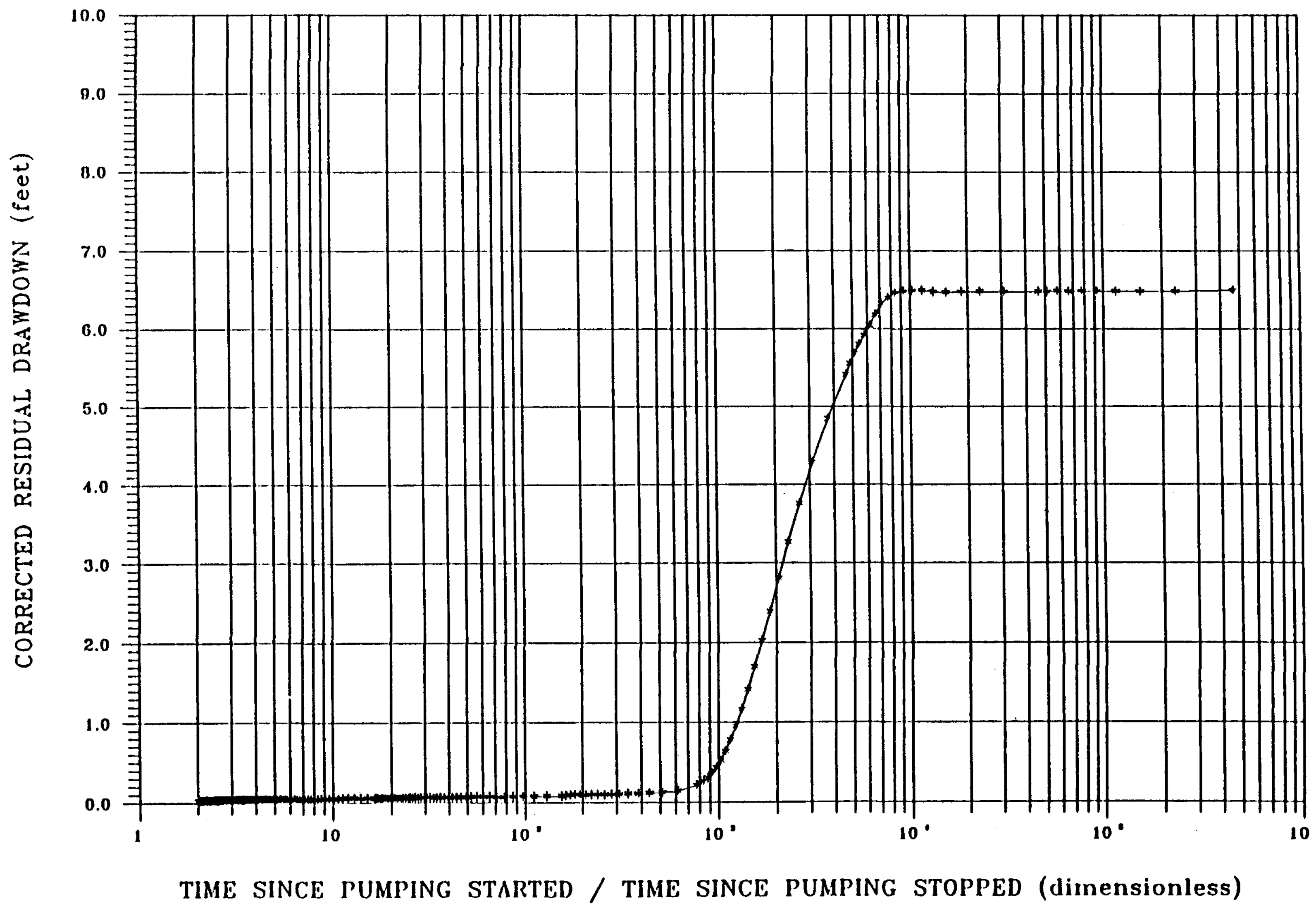
HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (3{,}800) / (11.3)$

K = 340 ft/day

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR04MW38A
CONSTANT RATE DISCHARGE TEST OF WELL IR04MW38A
HUNTERS POINT ANNEX SITE IR-4



PRELIMINARY DRAFT

Calculation Sheet - Well IR04P38A

PUMPED WELL:	IR04MW38A
TYPE OF DATA:	Residual drawdown
ANALYSIS METHOD:	Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 4.3 gpm = 828 ft^3/day

b Saturated thickness = 11.2 ft

Δs Change in residual drawdown = 0.04 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (828) / 4\ \pi\ (0.04)$

T = 3,800 ft^2/day

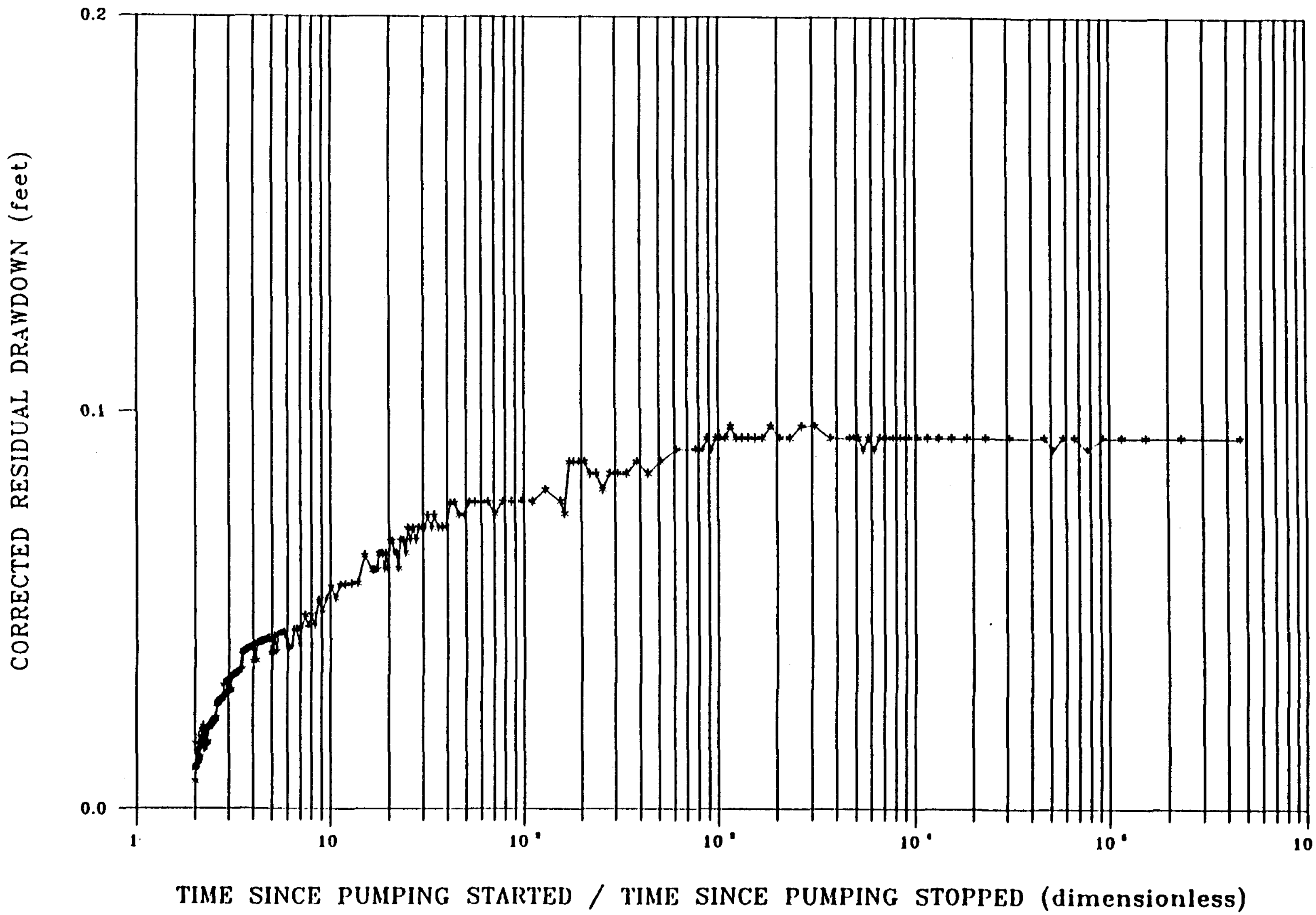
HYDRAULIC CONDUCTIVITY (K):

K = T / b

K = (3,800) / (11.2)

K = 340 ft/day

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR04P38A
CONSTANT RATE DISCHARGE TEST OF WELL IR04MW38A
HUNTERS POINT ANNEX SITE IR-4



C2-H

MATCHING CURVE AND
ESTIMATED HYDRAULIC PROPERTIES
FOR
CONSTANT-RATE PUMPING TEST 8

PRELIMINARY DRAFT

Calculation Sheet - Well IR05MW77A

PUMPED WELL: IR05MW77A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 2.6pm = 500 ft^3/day

b Saturated thickness = 25.5 ft

Δs Change in residual drawdown = 0.20 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (500) / 4\ \pi\ (0.20)$

T = 460 ft^2/day

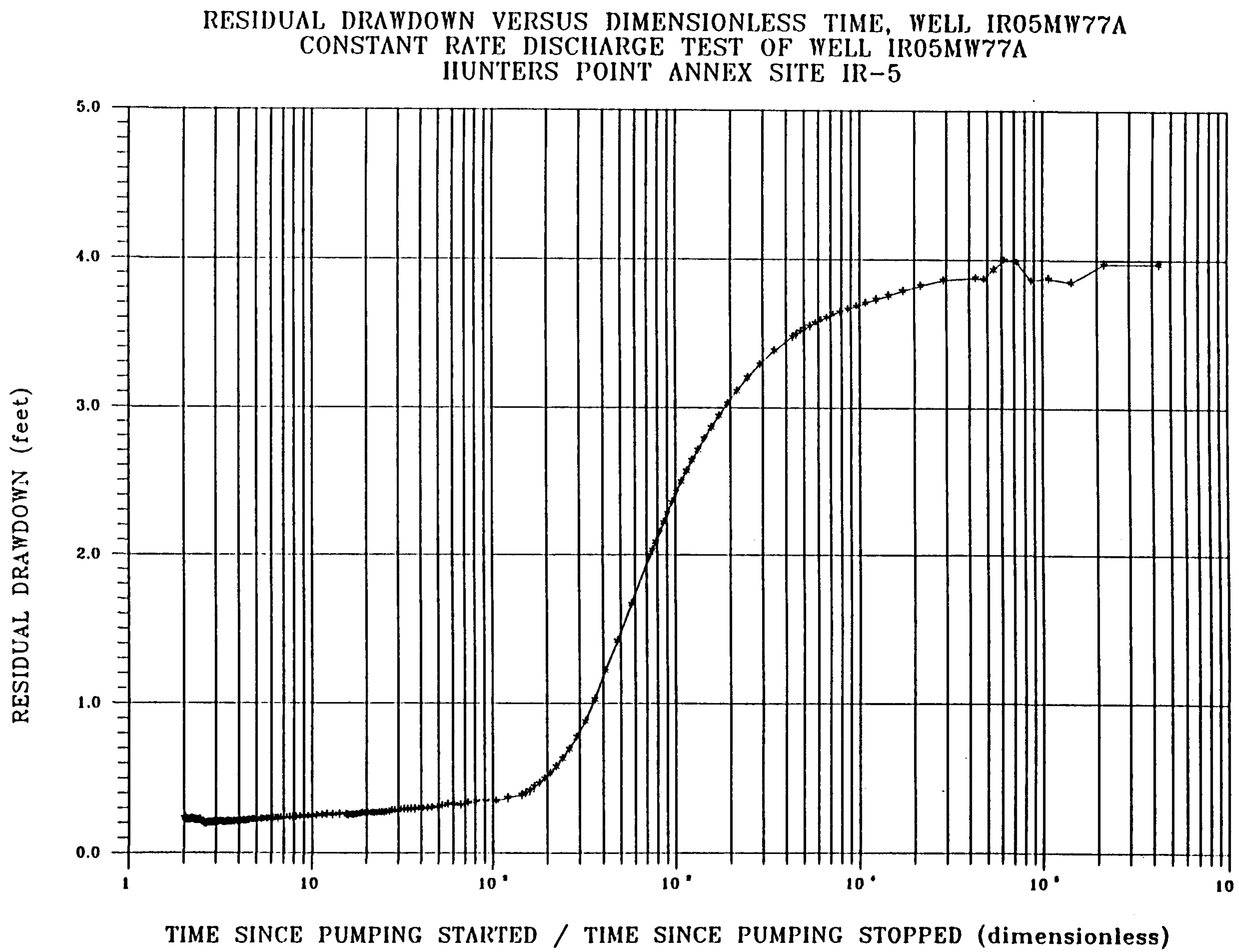
HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (460) / (25.5)$

K = 18 ft/day

PRELIMINARY DRAFT



PRELIMINARY DRAFT

Calculation Sheet - Well IR05P77AA

OBSERVATION WELL	IR05P77AA
PUMPED WELL:	IR05MW77A
TYPE OF DATA:	Drawdown early time
ANALYSIS METHOD:	Unconfined Aquifer with Delayed Yield (Neuman, 1975)

Equation Parameters:

Q Constant Discharge rate = 2.6 gpm = 500 ft^3/day

r Radius from pumped well = 11.0 ft

b Saturated thickness = 25.5 ft

Early time type curve match point:

$U_a = 0.166$ $W(U_a B) = 26.3$ $B = 0.001$

Drawdown (s) = 1 ft Time (t) = 10 min

TRANSMISSIVITY (T):

$T = Q\ W(U_a B)\ /\ 4\ \pi\ s$

$T = (500)\ (26.3)\ /\ 4\ \pi\ (1)$

T = 1,050 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (1{,}050) / (25.5)$

K = 41 ft/day

STORATIVITY (S):

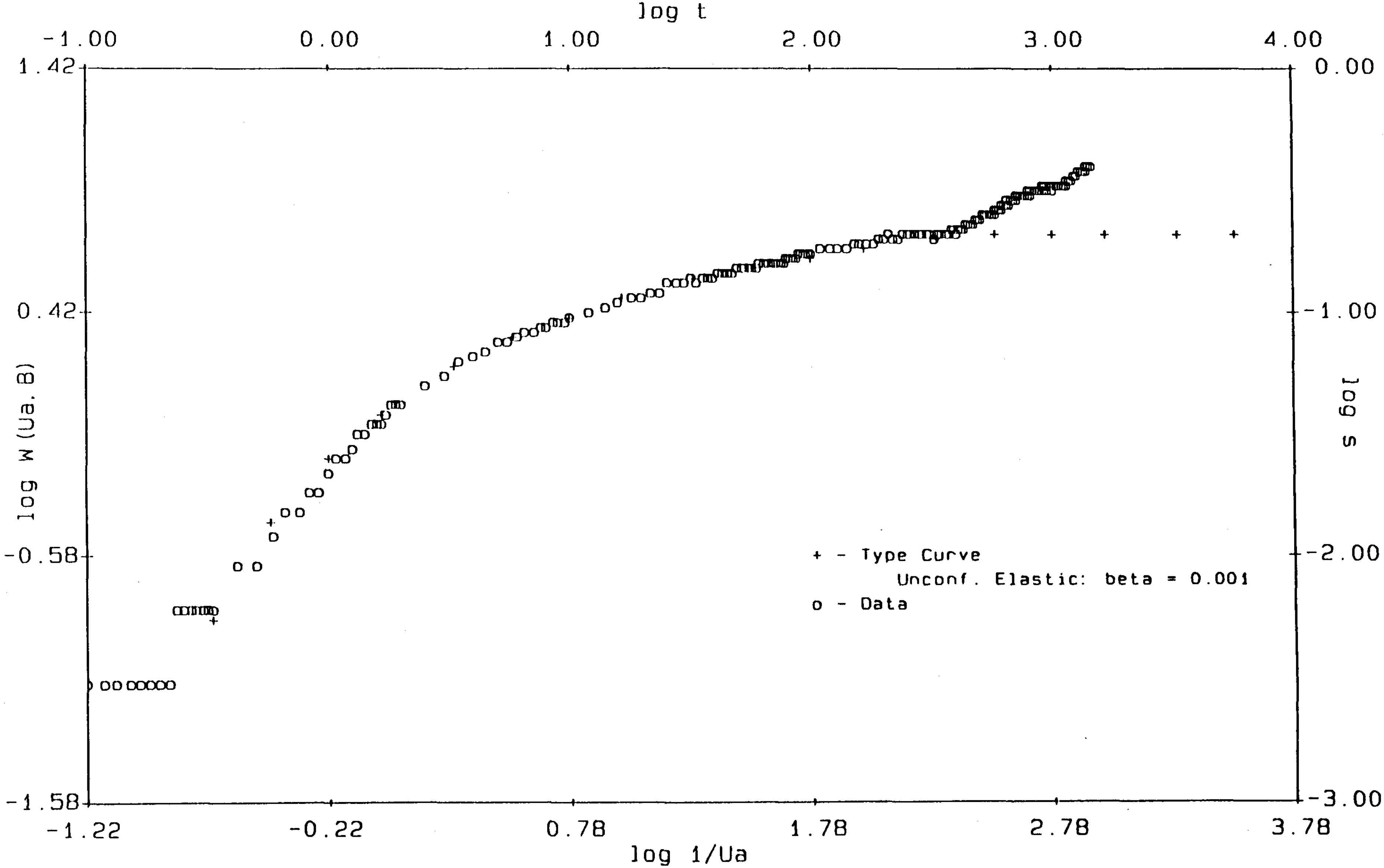
$S_s = U_a\ T\ t / r^2$

$S_s = (0.166) / (11.0)^2 = (0.166)\ (1050)\ (10) / (1{,}440\ ^{min}/day)\ (11.0)^2$

$S_s = 0.01$

PRELIMINARY DRAFT

WELL IR05P77AA



PRELIMINARY DRAFT

Calculation Sheet - Well IR05P77AA

PUMPED WELL: IR05MW77A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 2.6pm = 500 ft^3/day

b Saturated thickness = 25.5 ft

Δs Change in residual drawdown = 0.09 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (500) / 4\ \pi\ (0.09)$

$T = 1{,}000$ ft^2/day

HYDRAULIC CONDUCTIVITY (K):

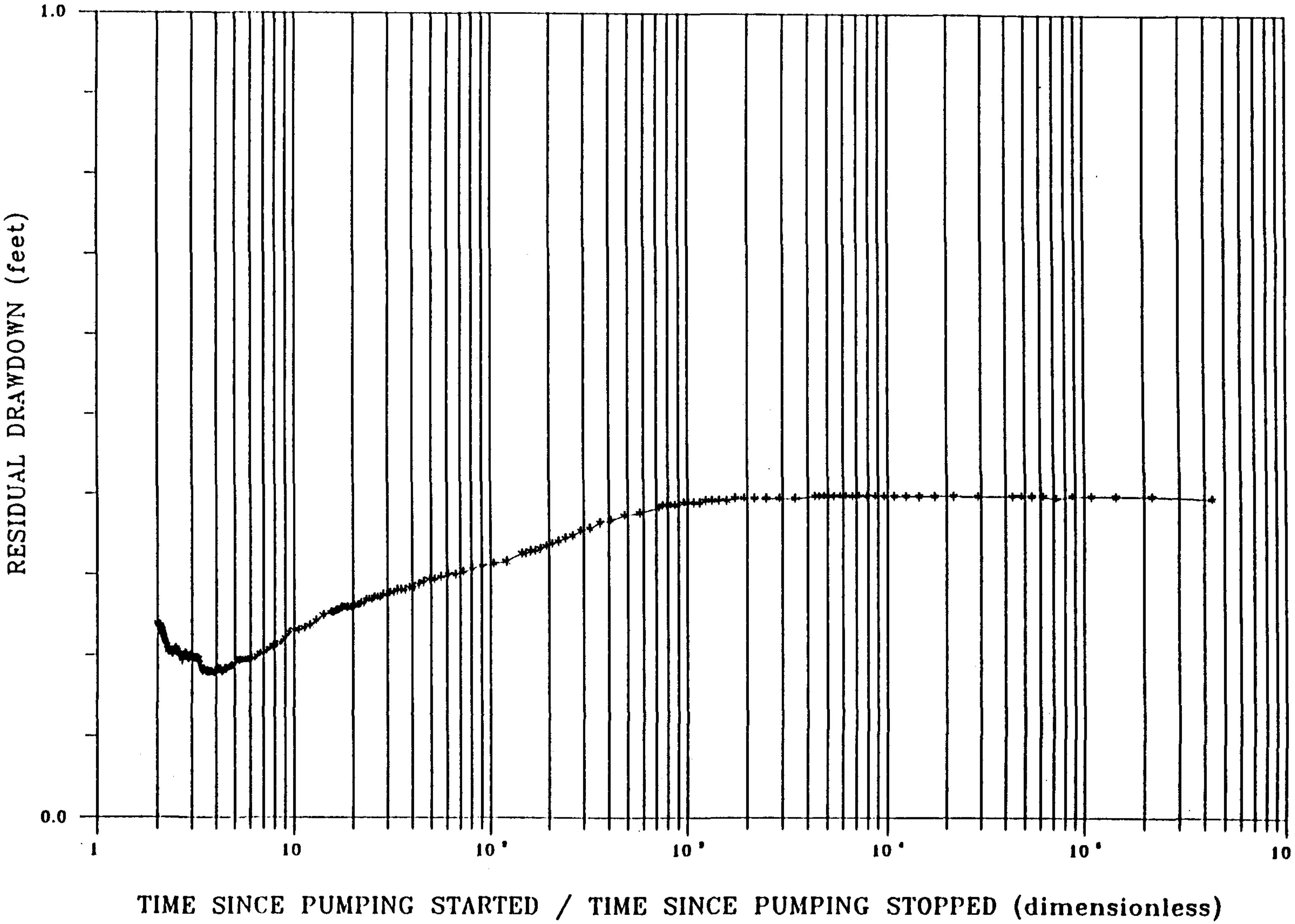
$K = T / b$

$K = (1{,}000) / (25.5)$

$K = 39$ ft/day

PRELIMINARY DRAFT

RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR05P77AA
CONSTANT RATE DISCHARGE TEST OF WELL IR05MW77A
HUNTERS POINT ANNEX SITE IR-5



PRELIMINARY DRAFT

Calculation Sheet - Well IR05P77AB

OBSERVATION WELL	IR05P77AB
PUMPED WELL:	IR05MW77A
TYPE OF DATA:	Drawdown early time
ANALYSIS METHOD:	Unconfined Aquifer with Delayed Yield (Neuman, 1975)

Equation Parameters:

Q Constant Discharge rate = 2.6 gpm = 500 ft^3/day

r Radius from pumped well = 21.5 ft

b Saturated thickness = 25 ft

Early time type curve match point:

$U_a = 0.309$ $W(U_a B) = 41.69$ $B = 0.001$

Drawdown (s) = 1 ft Time (t) = 10 min

TRANSMISSIVITY (T):

$T = Q\,W(U_a B)\ /\ 4\ \pi\ s$

$T = (500)\ (41.69)\ /\ 4\ \pi\ (1)$

T = 1,700 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

K = (1,700) / (25)

K = 68 ft/day

STORATIVITY (S):

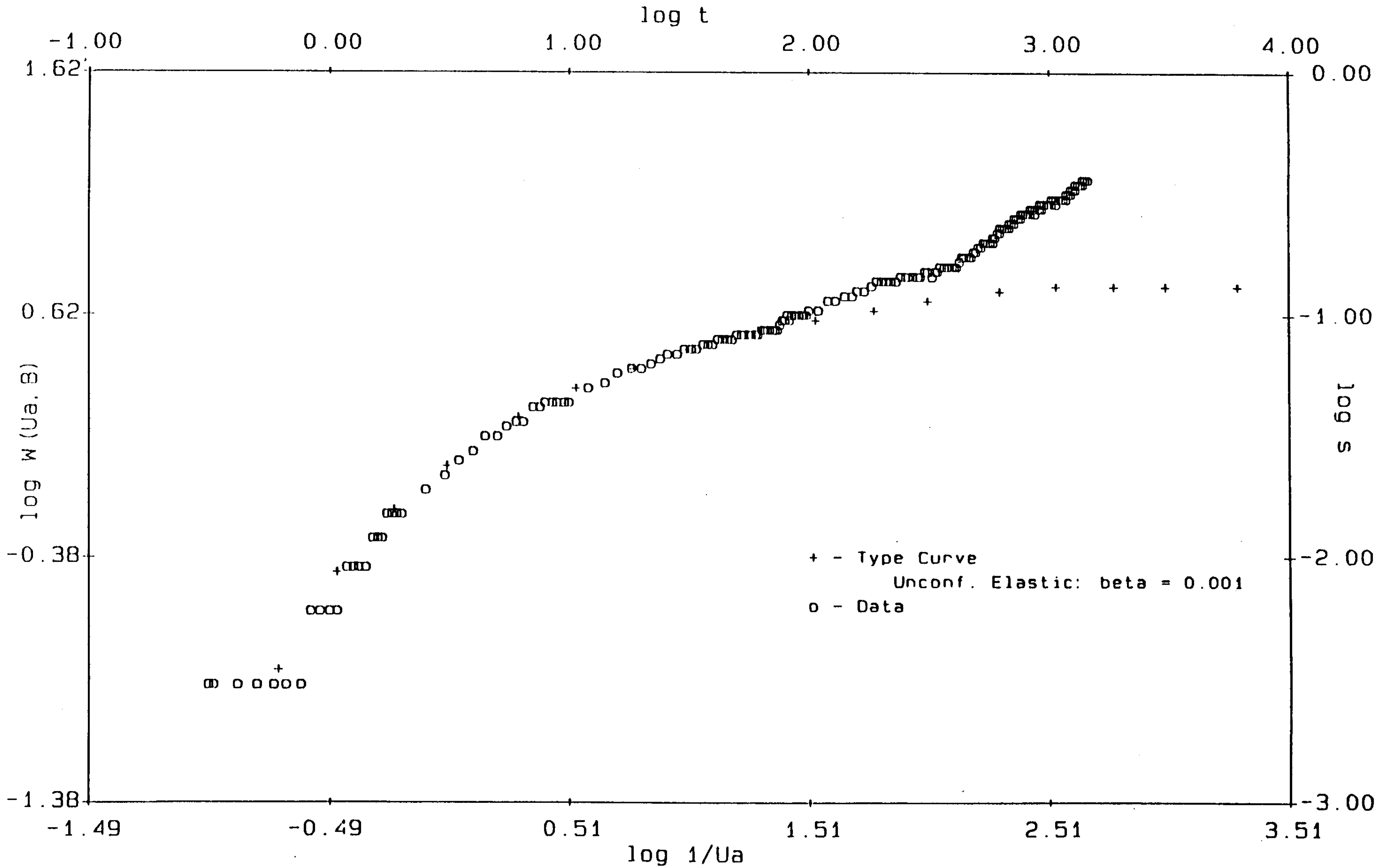
$S_s = U_a\, T\, t / r^2$

$S_s = (0.309)\ (1{,}700)\ (10)\ /\ (1{,}440\ ^{min}/day)\ (21.5)^2$

$S_s = 0.008$

PRELIMINARY DRAFT

WELL IR05P77AB



Calculation Sheet - Well IR05P77AB

PUMPED WELL: IR05MW77A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 2.6pm = 500 ft^3/day

b Saturated thickness = 25.5 ft

Δs Change in residual drawdown = 0.1 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi \Delta s$

$T = 2.3\ (500) / 4\ \pi\ (0.1)$

$T = 920\ ft^2/day$

HYDRAULIC CONDUCTIVITY (K):

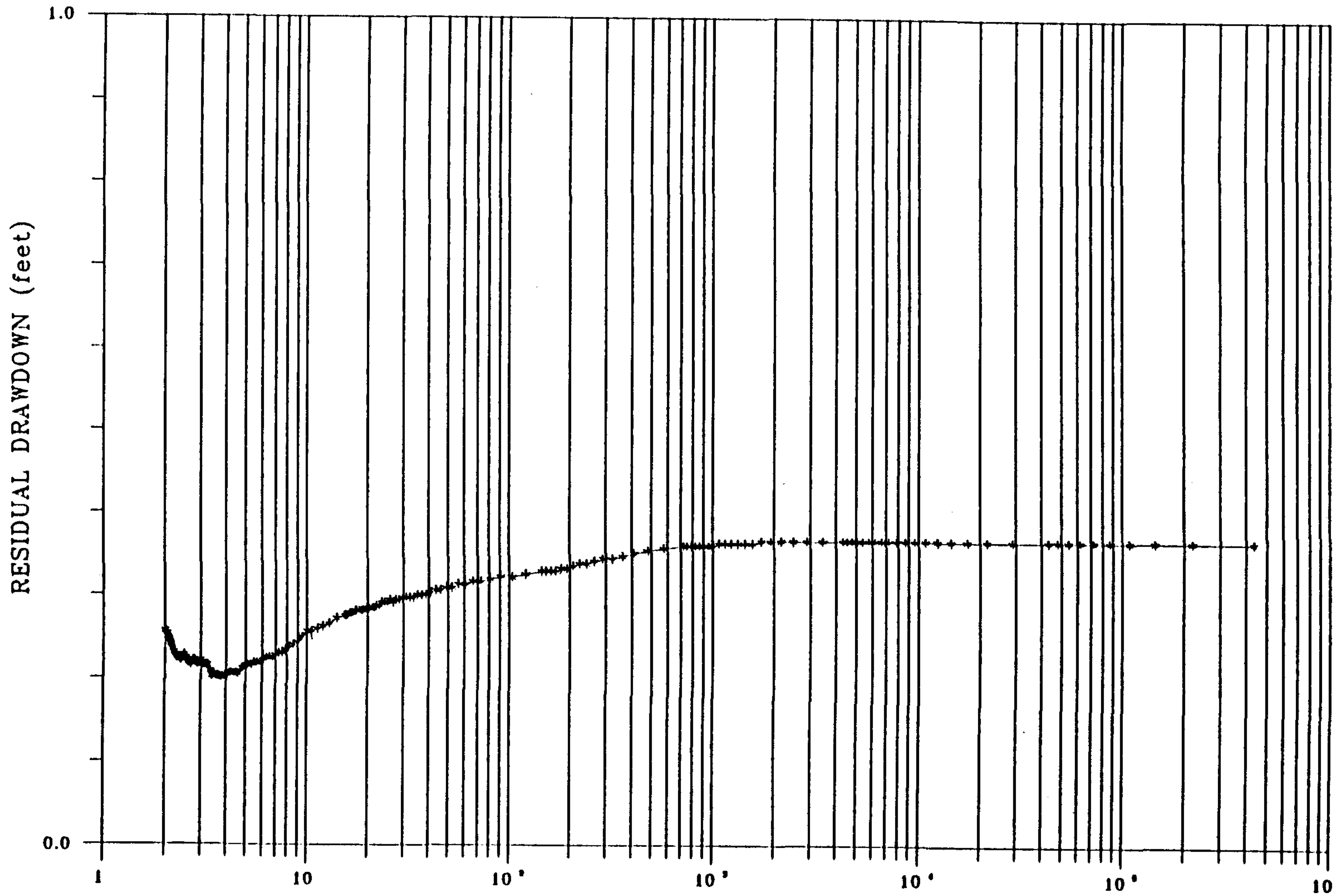
$K = T / b$

$K = (920) / (25.5)$

$K = 36\ ft/day$

PRELIMINARY DRAFT

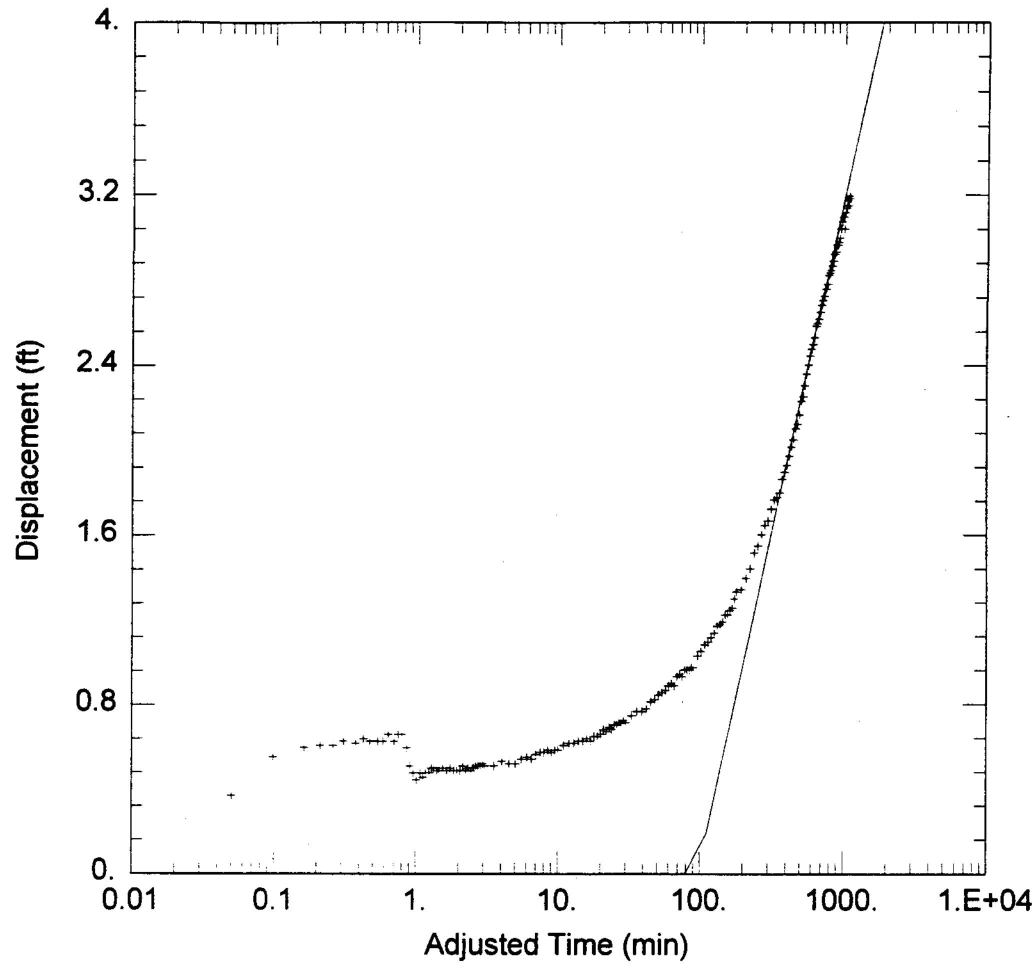
RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR05P77AB
CONSTANT RATE DISCHARGE TEST OF WELL IR05MW77A
HUNTERS POINT ANNEX SITE IR-5



TIME SINCE PUMPING STARTED / TIME SINCE PUMPING STOPPED (dimensionless)

C2-I

MATCHING CURVE AND
ESTIMATED HYDRAULIC PROPERTIES
FOR
CONSTANT-RATE PUMPING TEST 9



TEST E03, WELL IR15MW08A DRAWDOWN

Data Set: G:\EPUMP\E03PWDD.AQT
Date: 02/14/97 Time: 08:44:38

AQUIFER DATA

Saturated Thickness: 8.77 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

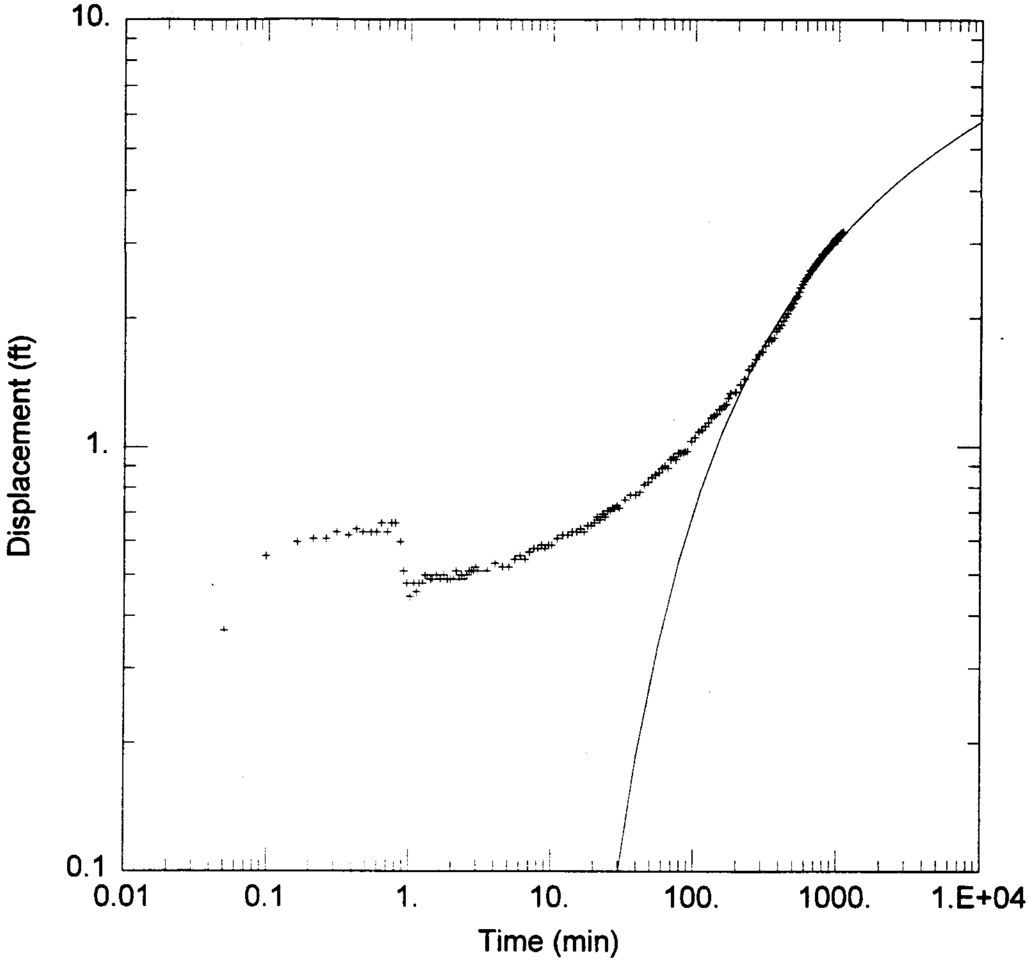
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15MW08A	0.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.1365 ft^2/min
S = 119.6



TEST E03, WELL IR15MW08A DRAWDOWN

Data Set: G:\EPUMP\E03PWDD.AQT
Date: 02/14/97 Time: 08:43:17

AQUIFER DATA

Saturated Thickness: 8.77 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

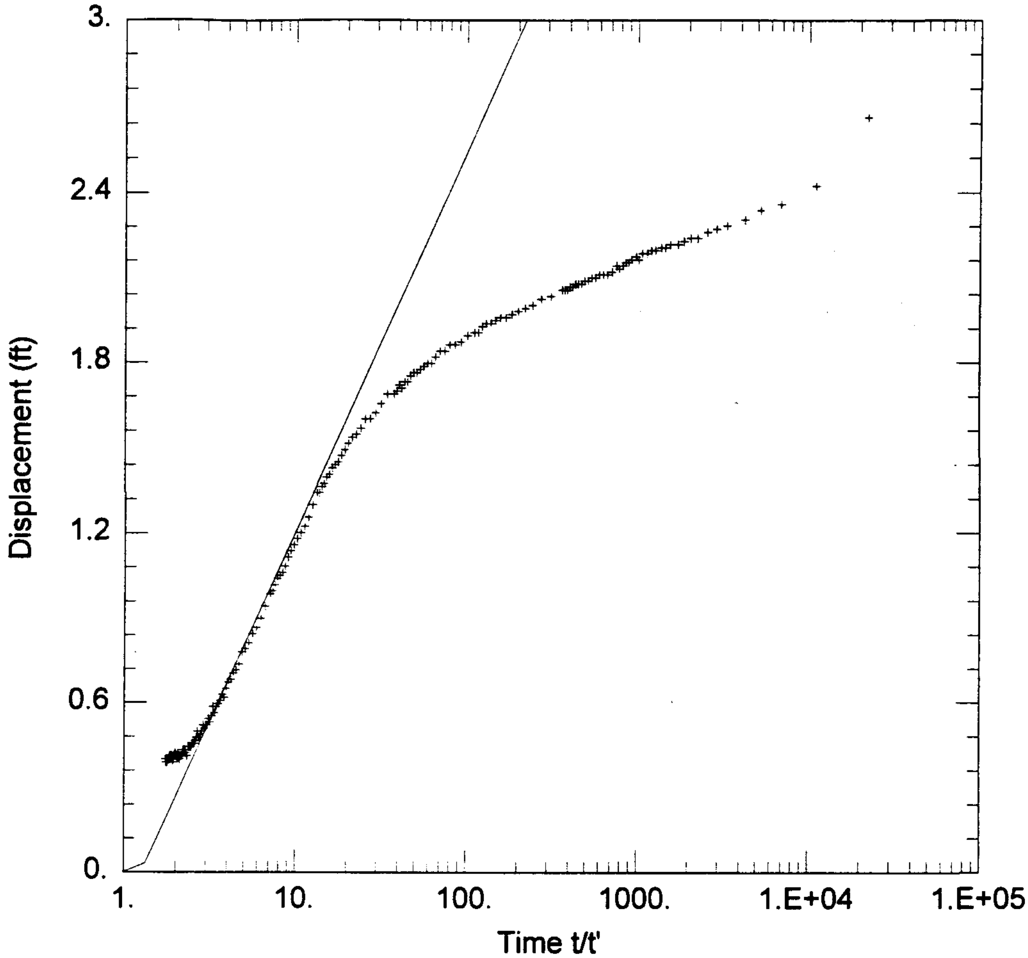
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15MW08A	0.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.1527 ft^2/min
S = 119.6



TEST E03, WELL IR15MW08A RECOVERY

Data Set: G:\EPUMP\E03PWRD.AQT
Date: 02/14/97 Time: 08:47:32

AQUIFER DATA

Saturated Thickness: 8.77 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

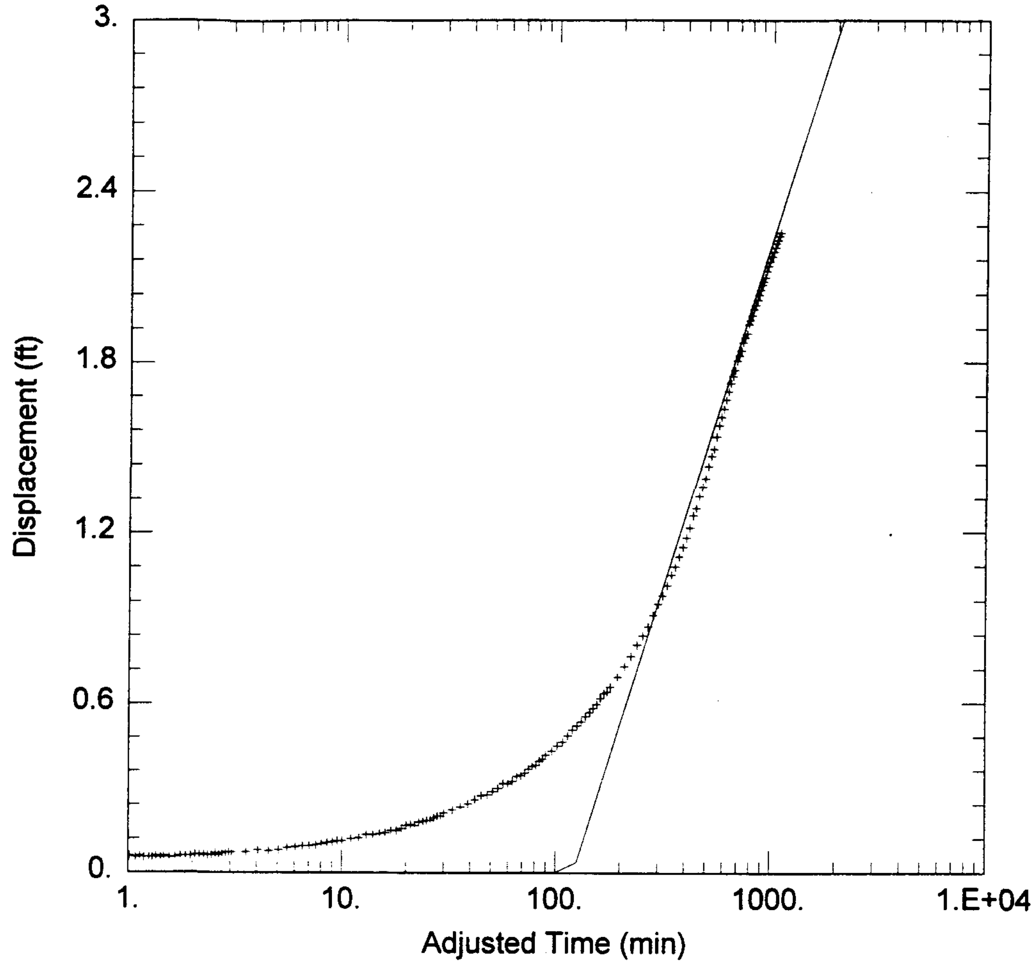
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15MW08A	0.5	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.3205 ft^2/min
S' = 1.265



TEST E03, WELL IR15P08AA DRAWDOWN

Data Set: G:\EPUMP\E03OW1DD.AQT
Date: 02/12/97 Time: 13:49:09

AQUIFER DATA

Saturated Thickness: 9.35 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

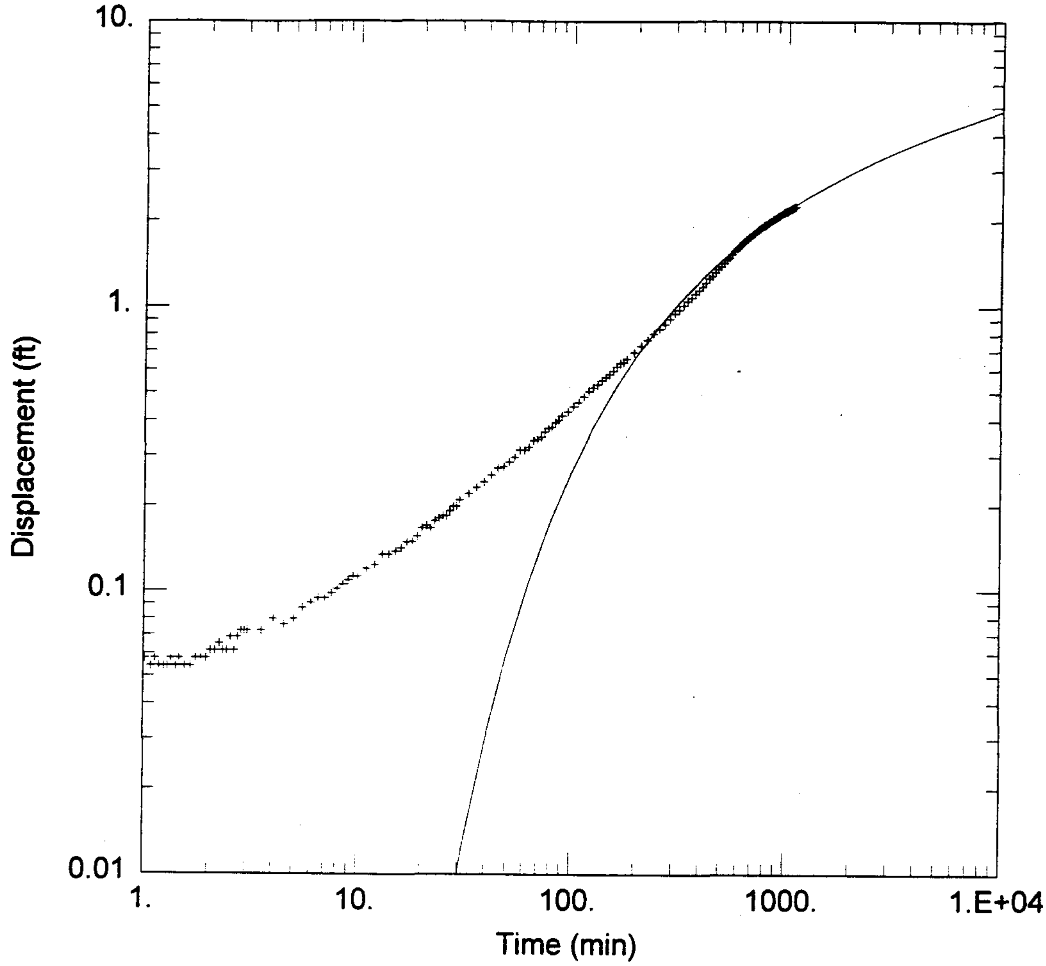
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15P08AA	12.2	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.1768 ft^2/min
S = 0.3245



TEST E03, WELL IR15P08AA DRAWDOWN

Data Set: G:\EPUMP\E03OW1DD.AQT
Date: 02/12/97 Time: 13:44:37

AQUIFER DATA

Saturated Thickness: 9.35 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

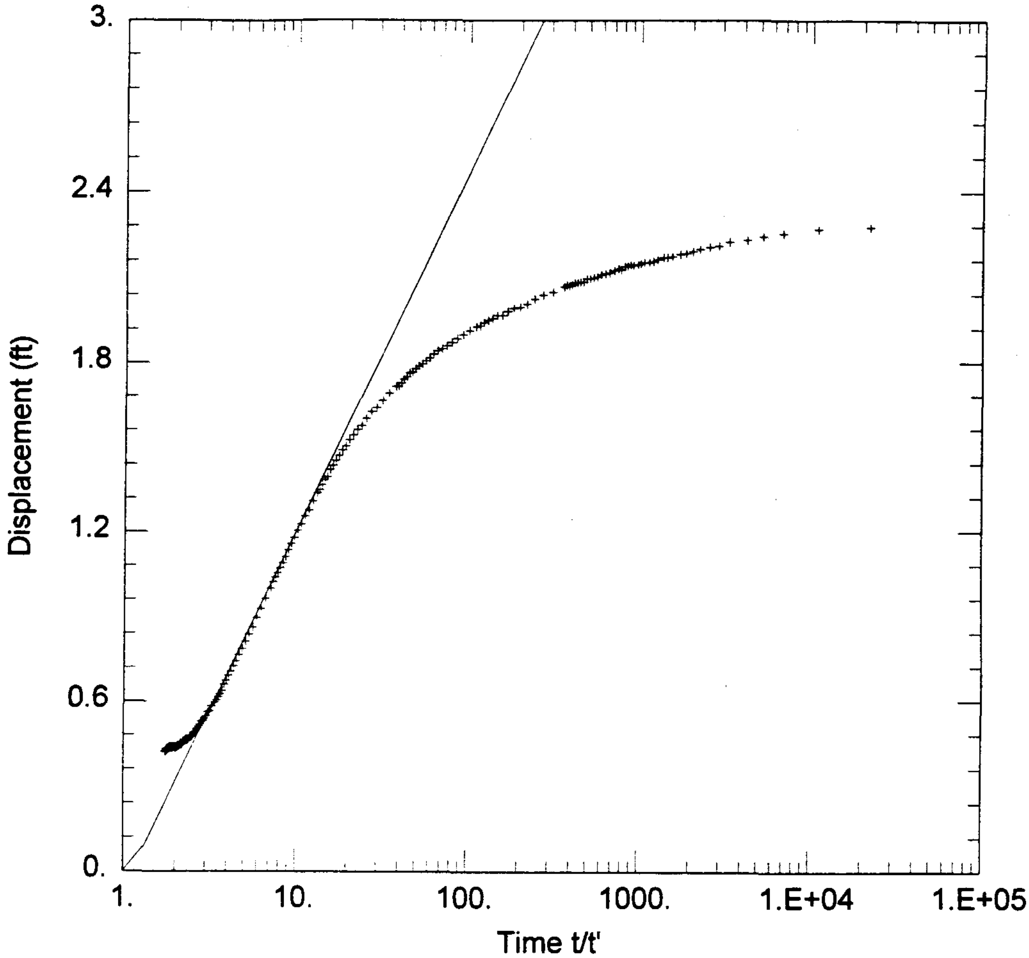
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15P08AA	12.2	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.1547 ft^2/min
S = 0.4174



TEST E03, WELL IR15P08AA RECOVERY

Data Set:
Date: 02/12/97 Time: 13:55:04

AQUIFER DATA

Saturated Thickness: 9.35 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

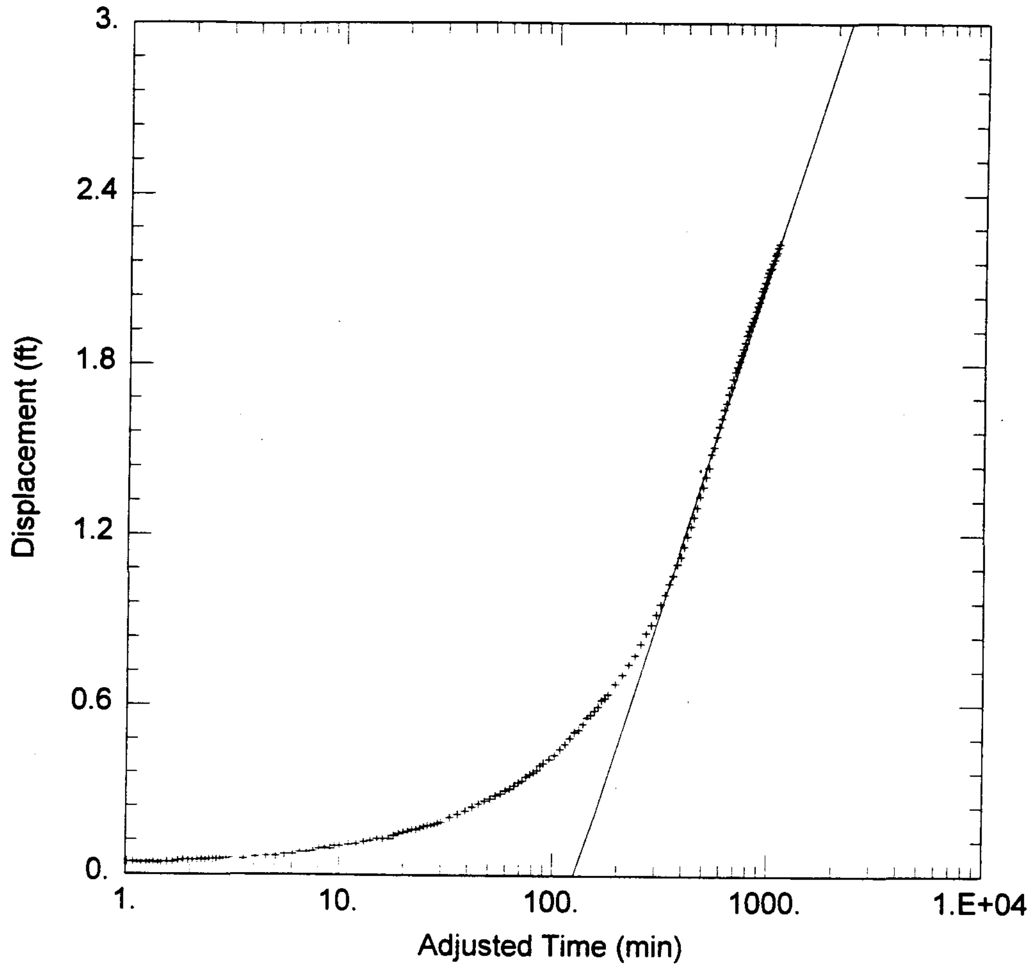
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15PP08AA	12.2	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.3387 ft^2/min
S' = 1.132



TEST E03, WELL IR15P08AB DRAWDOWN

Data Set: G:\EPUMP\E03OW2DD.AQT
Date: 02/12/97 Time: 14:17:27

AQUIFER DATA

Saturated Thickness: 9.61 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

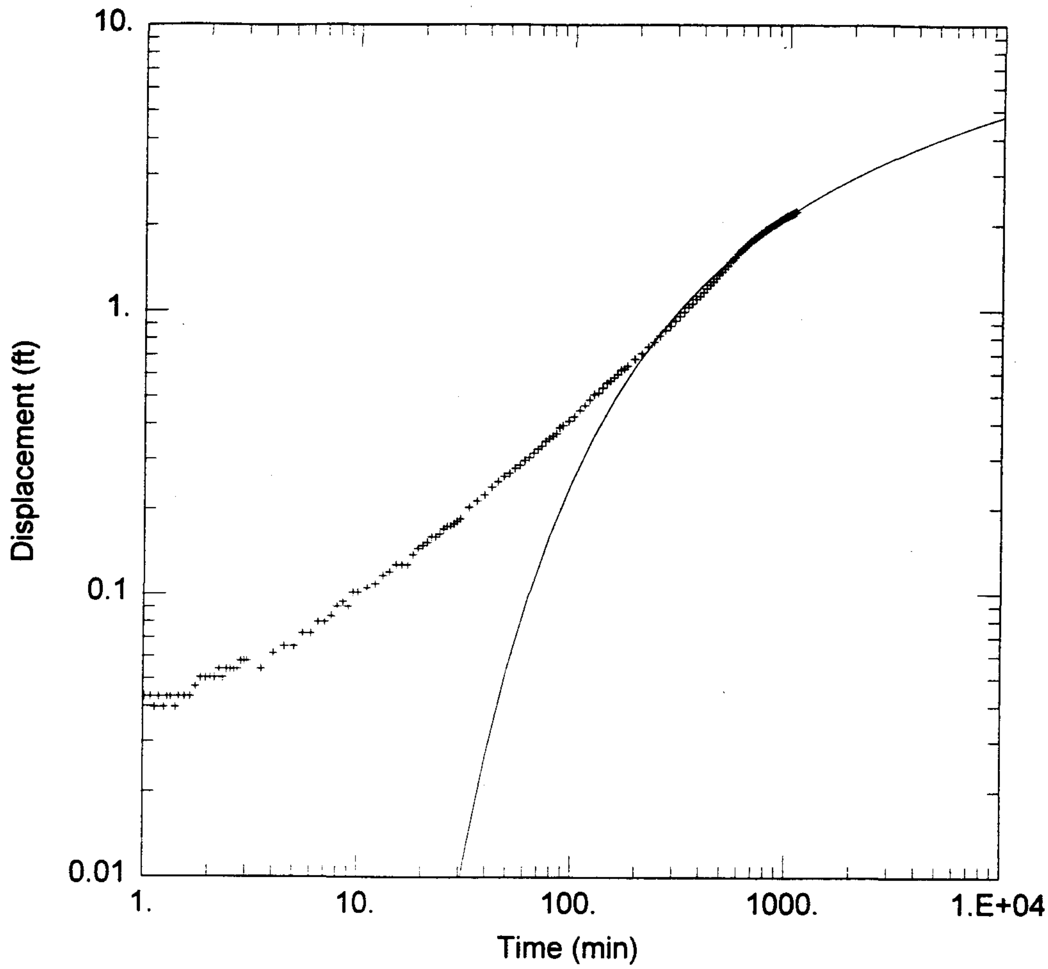
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15P08AB	22.3	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.1794 ft^2/min
S = 0.1044



TEST E03, WELL IR15P08AB DRAWDOWN

Data Set:
Date: 02/12/97

Time: 14:15:05

AQUIFER DATA

Saturated Thickness: 9.61 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

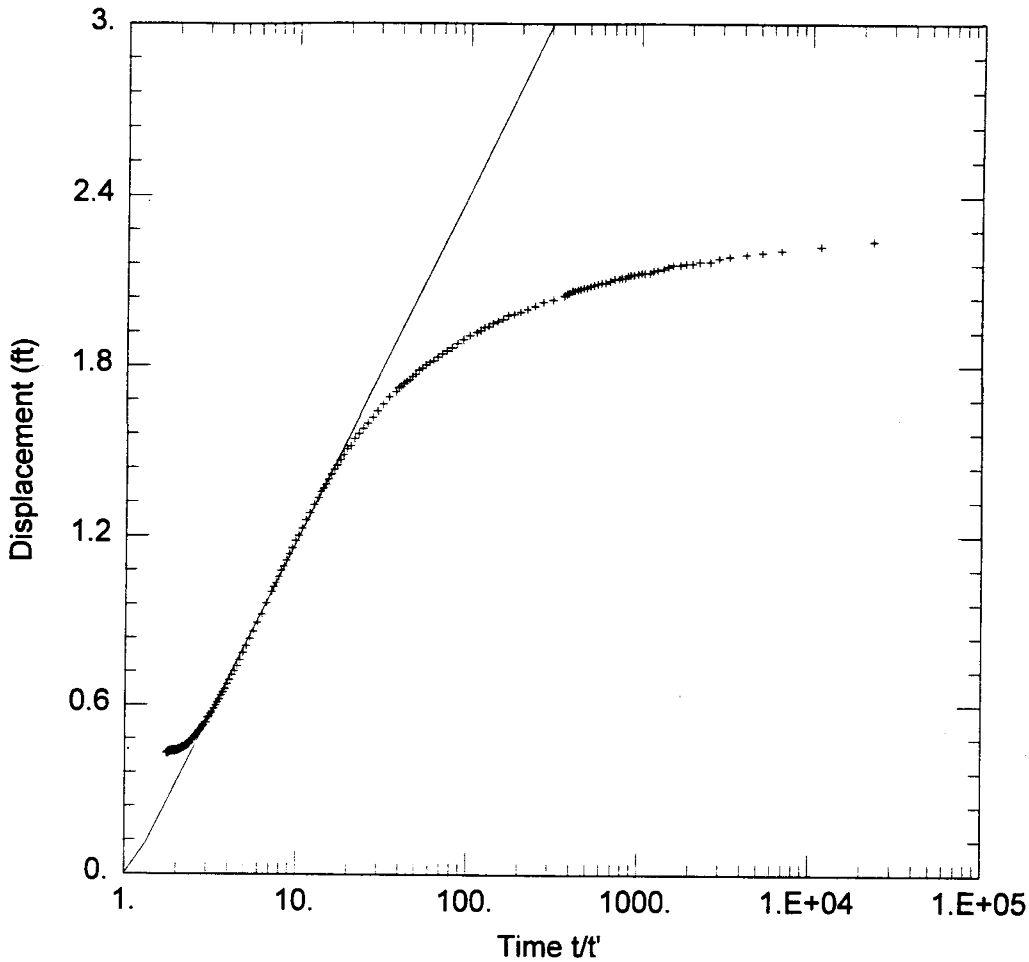
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15P08AB	22.3	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.1563 ft^2/min
S = 0.1295



TEST E03, WELL IR15P08AB RECOVERY

Data Set:
Date: 02/14/97 Time: 08:58:37

AQUIFER DATA

Saturated Thickness: 9.61 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

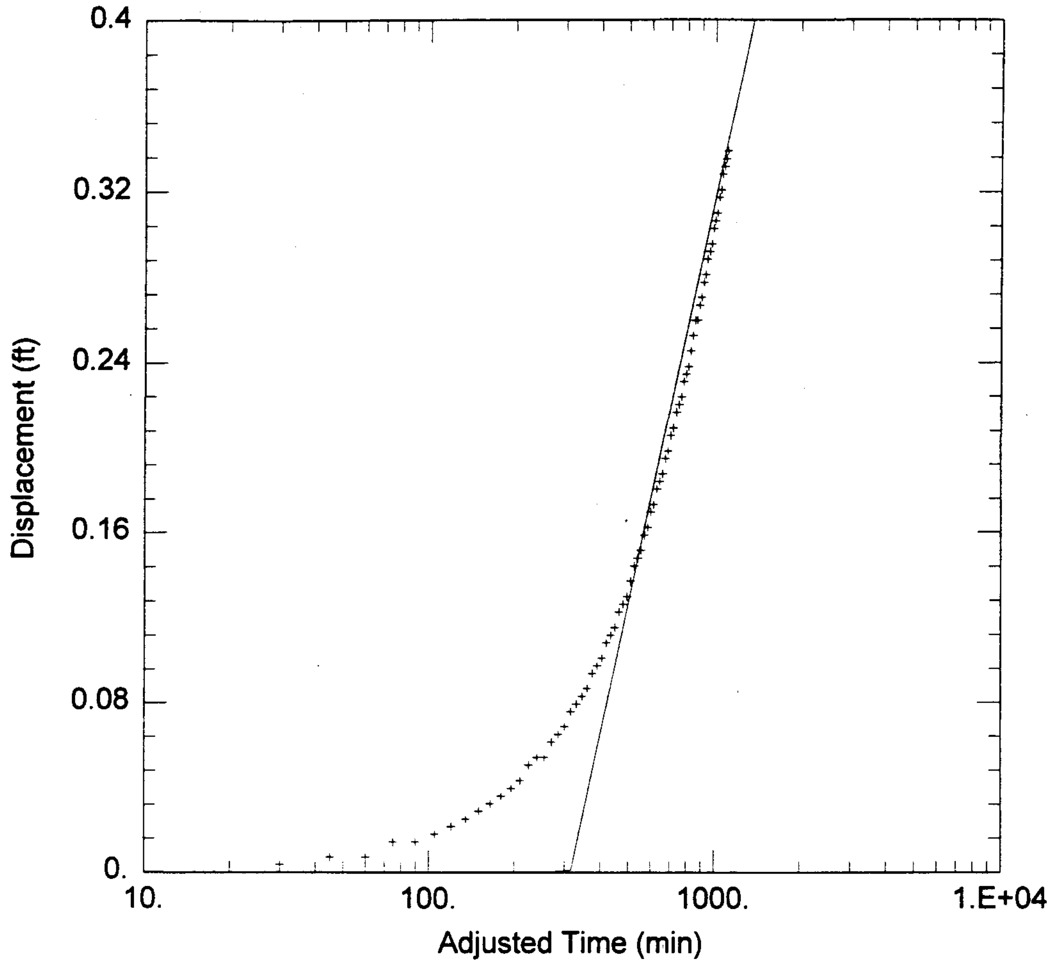
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15P08AB	22.3	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis Recovery

T = 0.3502 ft^2/min
S' = 1.088



TEST E03, WELL IR15MW06A DRAWDOWN

Data Set: G:\EPUMP\E03OW4DD.AQT
Date: 02/12/97 Time: 14:28:48

AQUIFER DATA

Saturated Thickness: 8.39 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

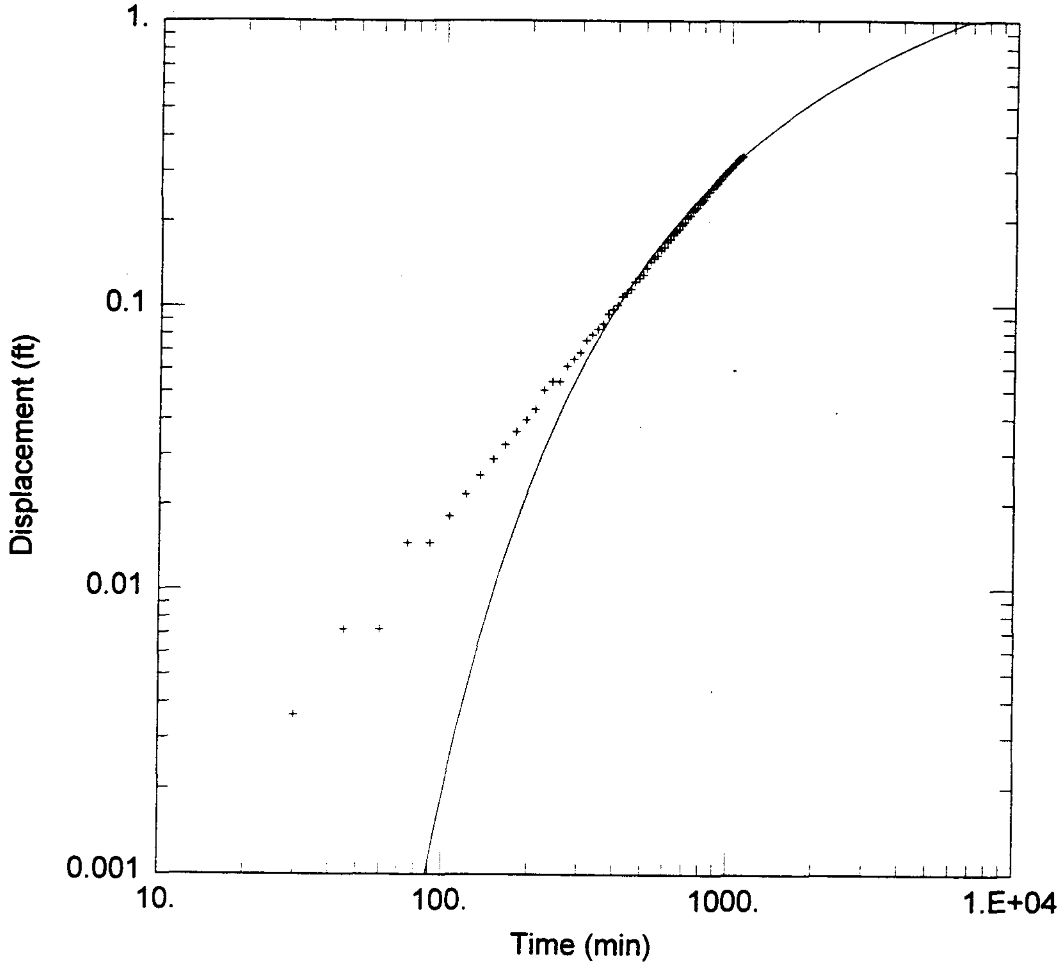
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15MW06A	78	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.6809 ft^2/min
S = 0.07922



TEST E03, WELL IR15MW06A DRAWDOWN

Data Set:
Date: 02/12/97

Time: 14:24:44

AQUIFER DATA

Saturated Thickness: 8.39 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

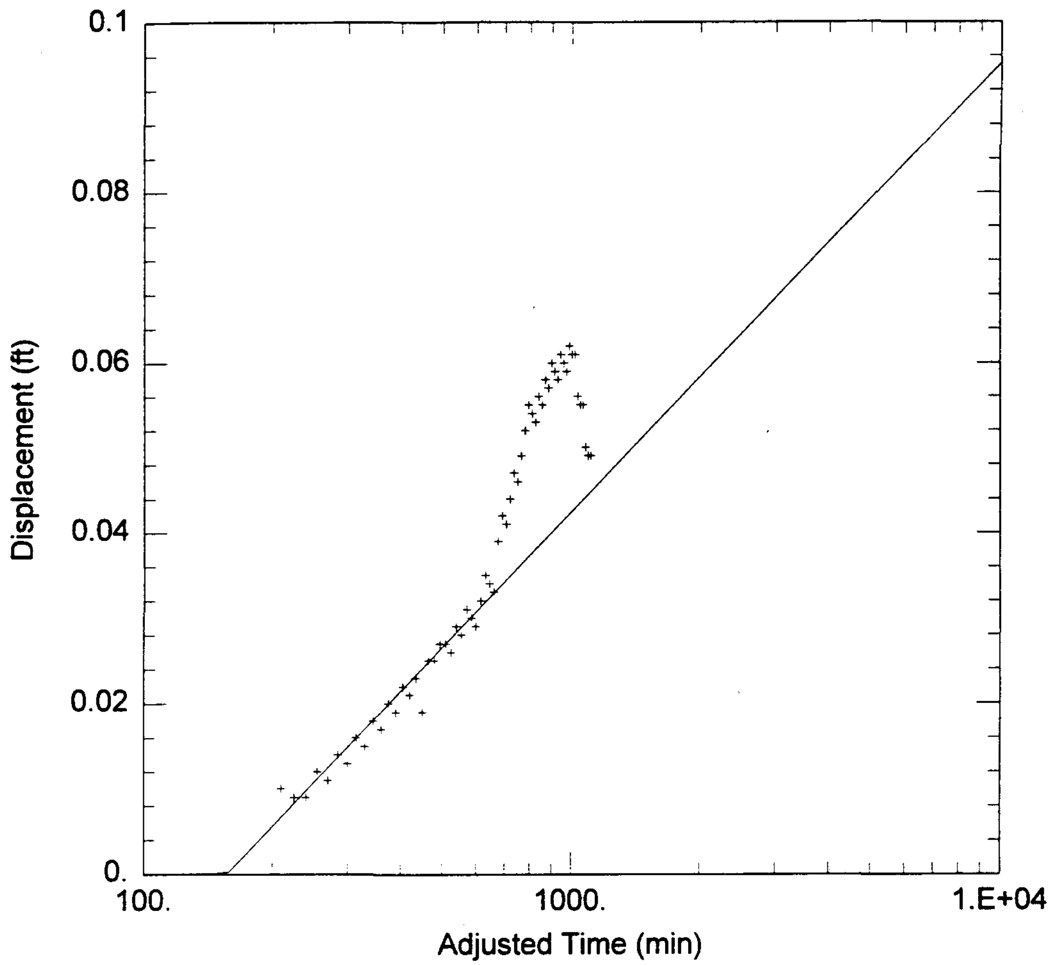
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15MW06A	78	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.4368 ft^2/min
S = 0.1111



TEST E03, IR14MW13A (CORRECTED)

Data Set: G:\EPUMPT\E03OW7DD.AQT
Date: 02/14/97 Time: 16:29:20

AQUIFER DATA

Saturated Thickness: 10.31 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

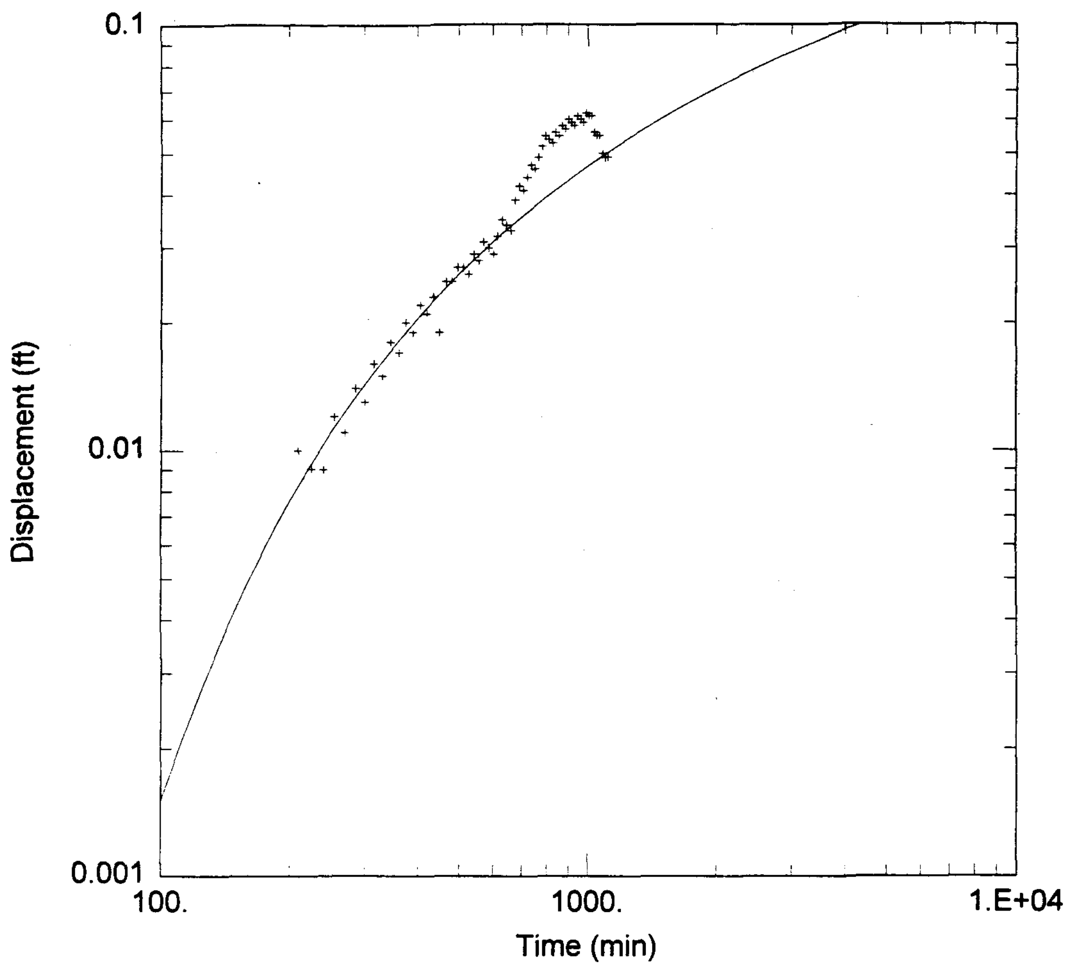
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR14MW13A	107	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 8.142 ft^2/min
S = 0.2504



TEST E03, IR14MW13A (CORRECTED)

Data Set: G:\EPUMPT\E03OW7DD.AQT
Date: 02/14/97 Time: 16:39:17

AQUIFER DATA

Saturated Thickness: 10.31 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

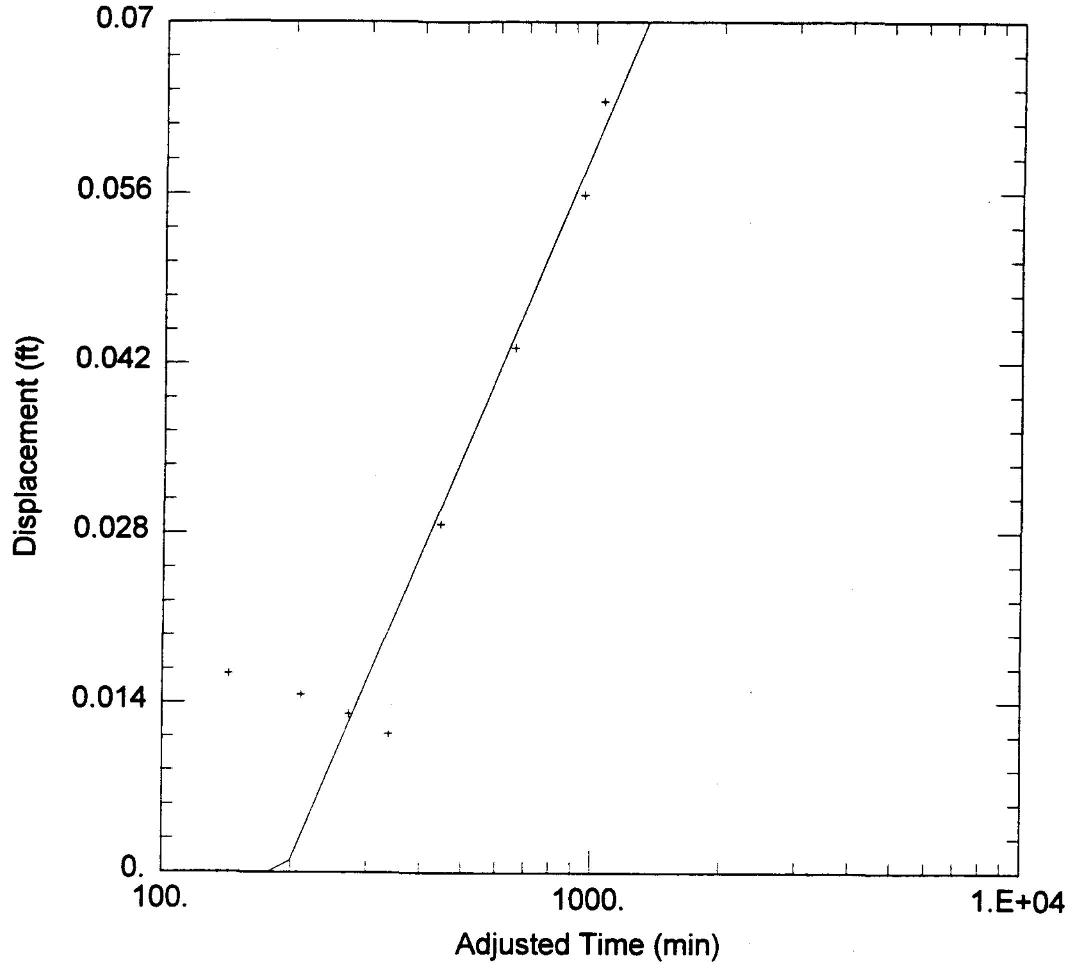
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR14MW13A	107	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 4.561 ft^2/min
S = 0.3512



TEST E03, IR02MW299A (CORRECTED)

Data Set: G:\EPUMP\E03OW6DD.AQT
Date: 02/14/97 Time: 16:25:21

AQUIFER DATA

Saturated Thickness: 10.55 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

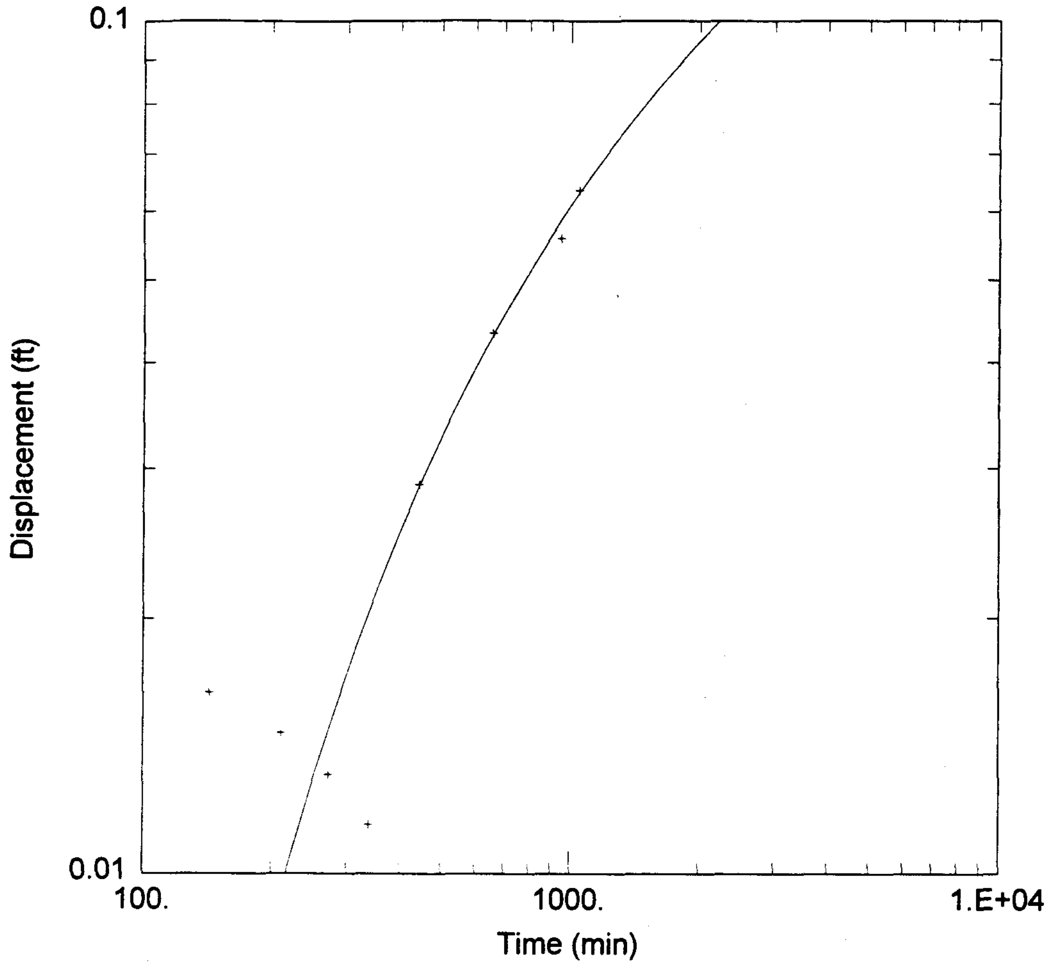
Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15MW299A	250	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 5.111 ft^2/min
S = 0.03573



TEST E03, IR02MW299A (CORRECTED)

Data Set: G:\EPUMP\E03OW6DD.AQT
Date: 02/14/97 Time: 16:24:10

AQUIFER DATA

Saturated Thickness: 10.55 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
IR15MW08A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
+ IR15MW299A	250	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 3.205 ft^2/min
S = 0.05103

C2-J

MATCHING CURVE AND ESTIMATED HYDRAULIC PROPERTIES FOR CONSTANT-RATE PUMPING TEST 10

PRELIMINARY DRAFT

Calculation Sheet - Well IR12MW12A

PUMPED WELL:	IR12MW12A
TYPE OF DATA:	Residual drawdown
ANALYSIS METHOD:	Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 3.0 gpm = 577 ft^3/day

b Saturated thickness = 10.4 ft

Δs Change in residual drawdown = 0.08 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (577) / 4\ \pi\ (0.08)$

$T = 1{,}300\ ft^2/day$

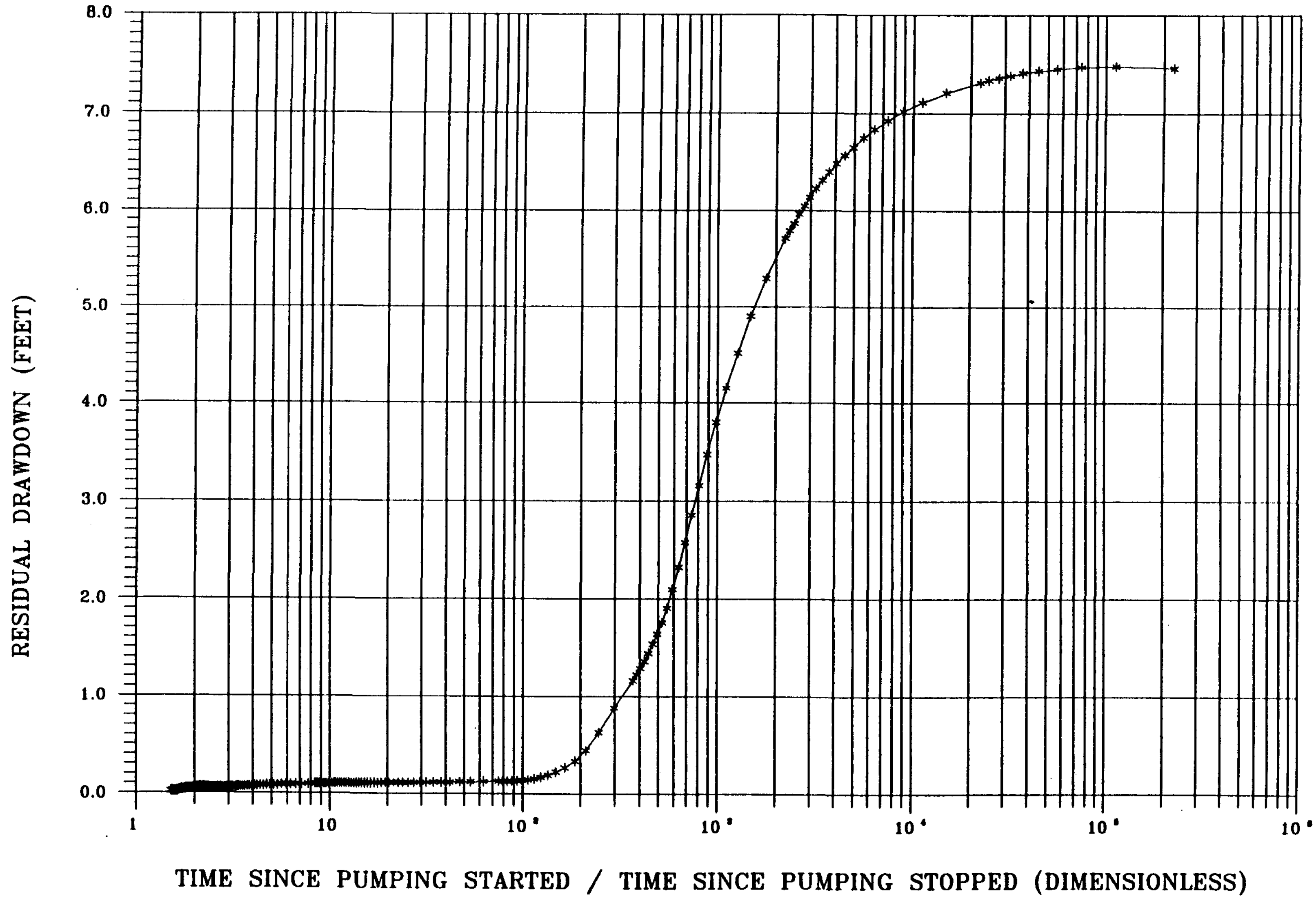
HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (1{,}300) / (10.4)$

$K = 130$ ft/day

RESIDUAL DRAWDOWN
HUNTERS POINT ANNEX SITE IR-12
RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR12MW12A
CONSTANT RATE DISCHARGE TEST OF WELL IR12MW12A



Calculation Sheet - Well IR12P12AA

OBSERVATION WELL	IR12P12AA
PUMPED WELL:	IR12MW12A
TYPE OF DATA:	Drawdown early time
ANALYSIS METHOD:	Unconfined Aquifer with Delayed Yield (Neuman, 1975)

Equation Parameters:

Q Constant Discharge rate = 3.0 gpm = 577 ft^3/day

r Radius from pumped well = 83.5 ft

b Saturated thickness = 10.3 ft

Early time type curve match point:

$U_a = 5.50$ $W(U_a B) = 72.44$ $B = 0.001$

Drawdown (s) = 1 ft Time (t) = 10 min

TRANSMISSIVITY (T):

$T = Q\, W(U_a B)\ /\ 4\ \pi\ s$

$T = (577)\ (72.44)\ /\ 4\ \pi\ (1)$

T = 3,300 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T\ /\ b$

$K = (3{,}300)\ /\ (10.3)$

K = 320 ft/day

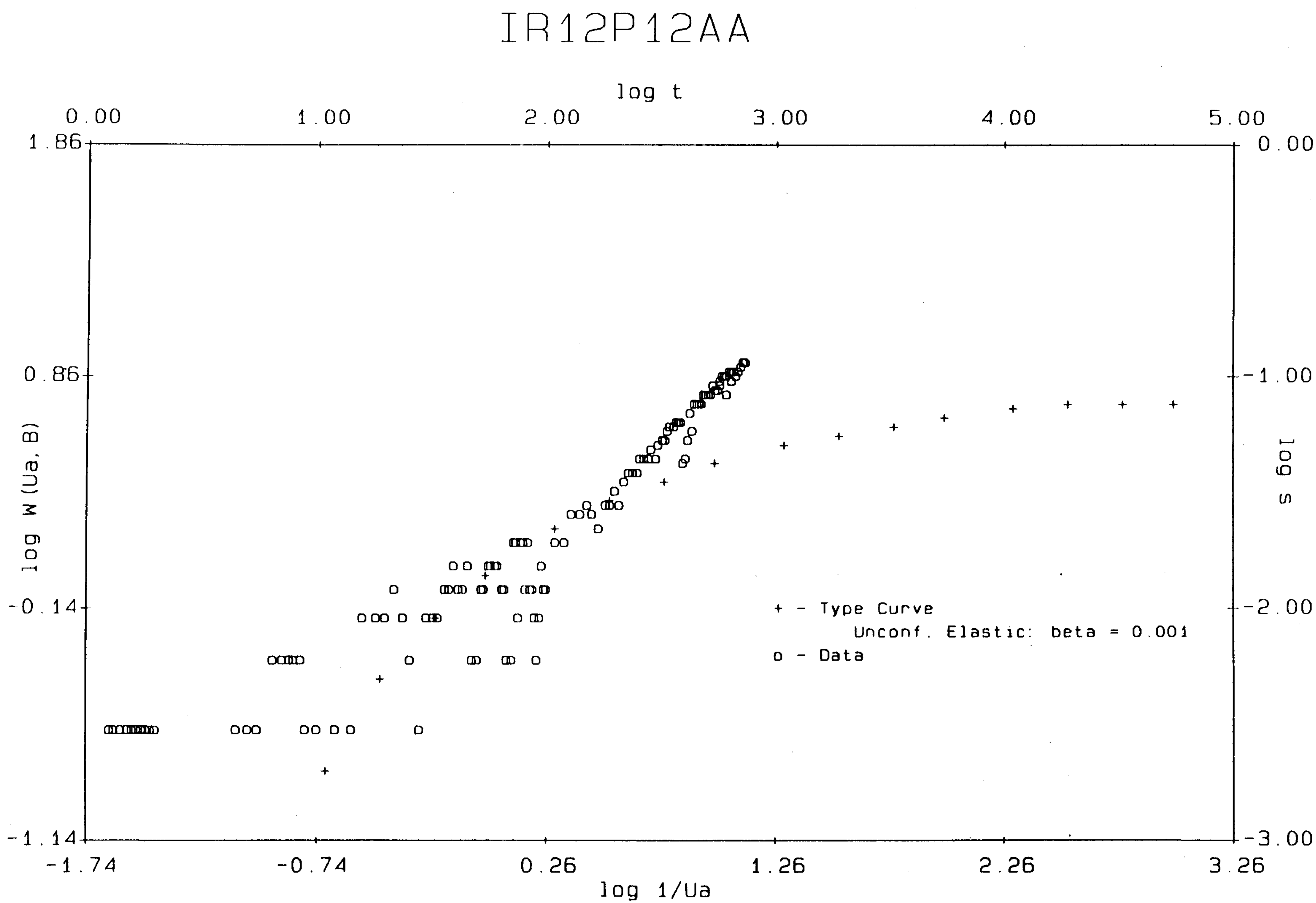
STORATIVITY (S):

$S_s = U_a\ T\ t\ /\ r^2$

S_s = (5.50) (3,300 (10) / (1,440 min/day) $(83.5)^2$

$S_s = 0.18$

PRELIMINARY DRAFT



PRELIMINARY DRAFT

Calculation Sheet - Well IR12P12AA

PUMPED WELL:	IR12MW12AA
TYPE OF DATA:	Residual drawdown
ANALYSIS METHOD:	Theis Recovery (Theis, 1935)

Equation Parameters:

Q	Constant Discharge rate = 3.0 gpm = 577 ft^3/day
b	Saturated thickness = 10.3 ft
Δs	Change in residual drawdown = 0.09 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (577) / 4\ \pi\ (0.09)$

$T = 1{,}200\ ft^2/day$

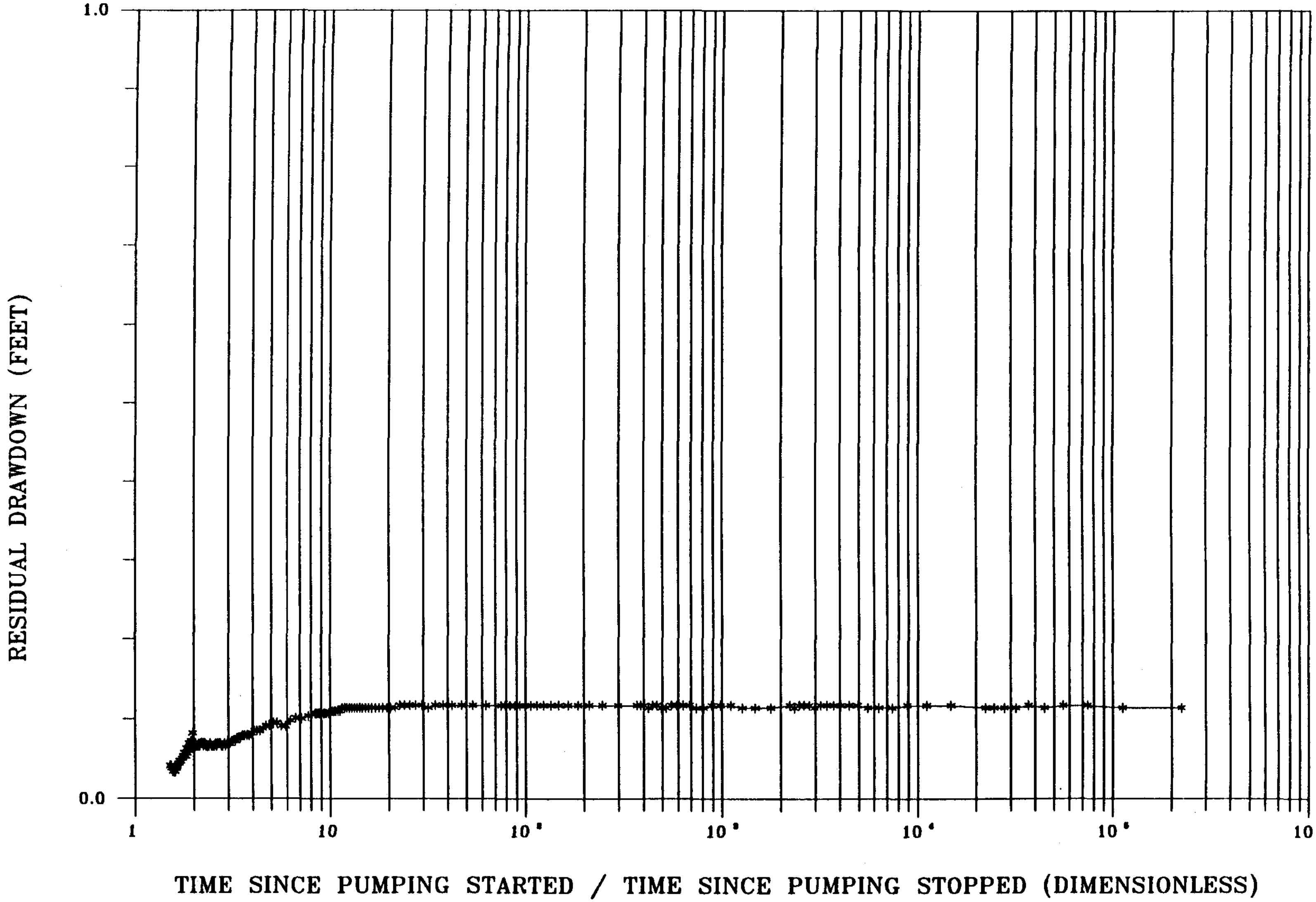
HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (1{,}200) / (10.3)$

$K = 120$ ft/day

RESIDUAL DRAWDOWN
HUNTERS POINT ANNEX SITE IR-12
RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR12P12AA
CONSTANT RATE DISCHARGE TEST OF WELL IR12MW12A



Calculation Sheet - Well IR12P12AB

OBSERVATION WELL: IR12P12AB

PUMPED WELL: IR12MW12A

TYPE OF DATA: Drawdown early time

ANALYSIS METHOD: Unconfined Aquifer with Delayed Yield (Neuman, 1975)

Equation Parameters:

Q Constant Discharge rate = 3.0 gpm = 577 ft^3/day

r Radius from pumped well = 11.7 ft

b Saturated thickness = 10.3 ft

Early time type curve match point:

$U_a = 1.29$ $W(U_a B) = 45.71$ $B = 0.001$

Drawdown (s) = 1 ft Time (t) = 10 min

TRANSMISSIVITY (T):

$T = Q\ W(U_a B)\ /\ 4\ \pi\ s$

$T = (577)\ (45.71)\ /\ 4\ \pi\ (1)$

T = 2,100 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (2,100) / (10.3)$

K = 200 ft/day

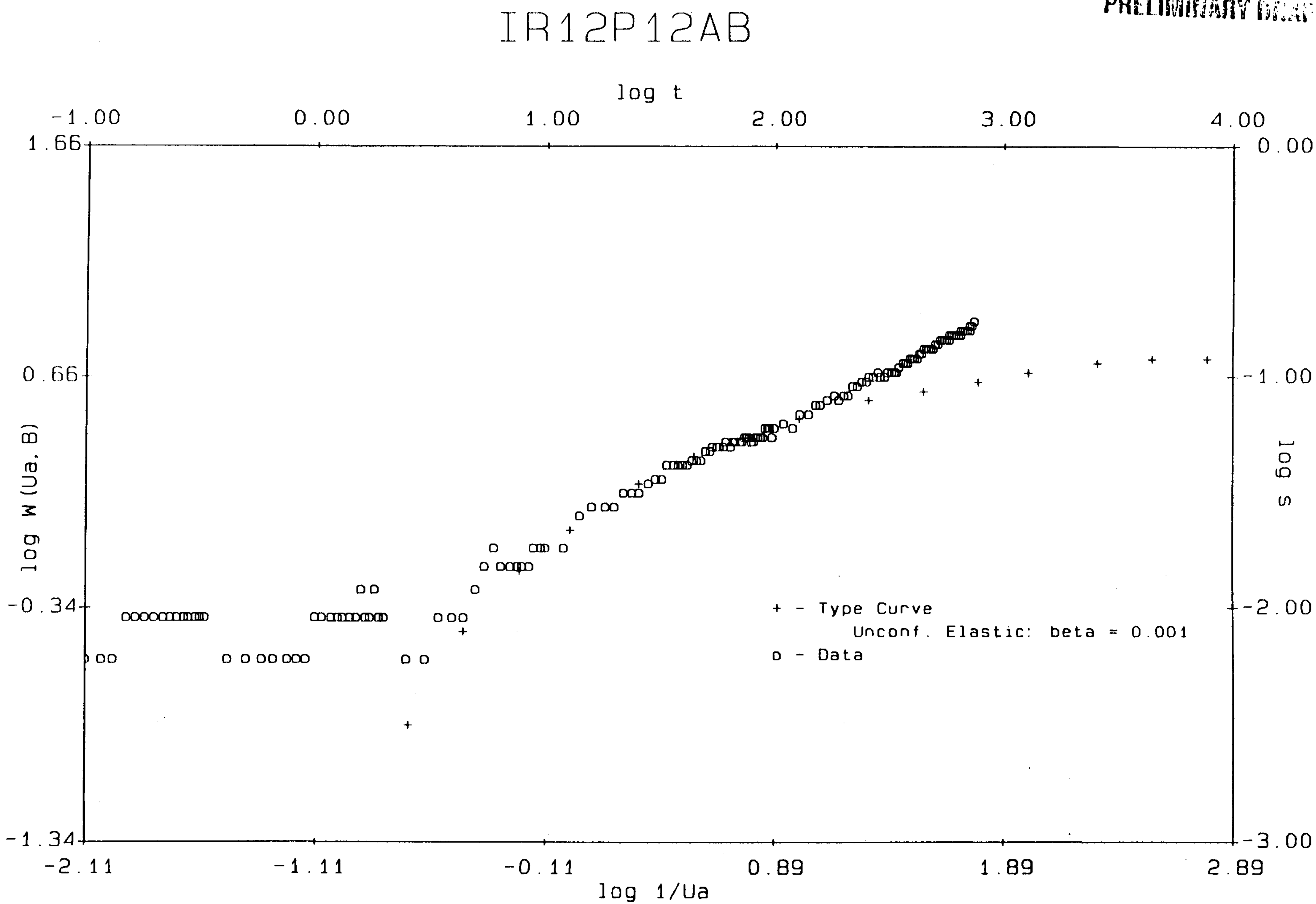
STORATIVITY (S):

$S_s = U_a\ T\ t / r^2$

$S_s = (1.29)\ (2,100)\ (10) / (1,440 \text{ min/day}) / (11.7)^2$

$S_s = 0.14$

PRELIMINARY DRAFT



PRELIMINARY DRAFT

Calculation Sheet - Well IR12P12AB

PUMPED WELL:	IR12MW12A
TYPE OF DATA:	Residual drawdown
ANALYSIS METHOD:	Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 3.0 gpm = 577 ft^3/day

b Saturated thickness = 10.3 ft

Δs Change in residual drawdown = 0.09 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\ Q / 4\ \pi\ \Delta s$

$T = 2.3\ (577) / 4\ \pi\ (0.09)$

T = 1,200 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

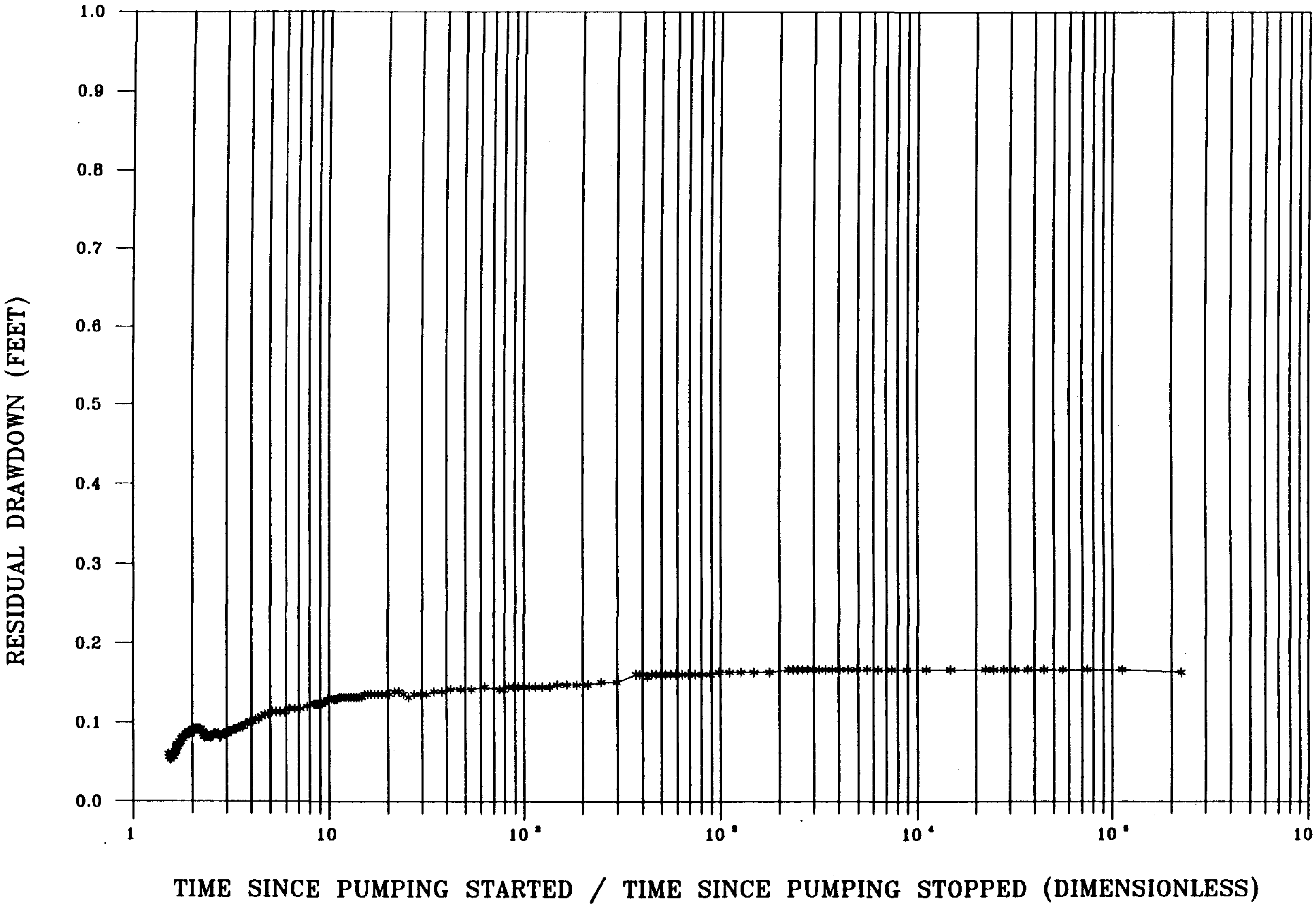
$K = T / b$

$K = (1{,}200) / (10.3)$

K = 120 ft/day

PRELIMINARY DRAFT

RESIDUAL DRAWDOWN
HUNTERS POINT ANNEX SITE IR-12
RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR12P12AB
CONSTANT RATE DISCHARGE TEST OF WELL IR12MW12A



C2-K

MATCHING CURVE AND ESTIMATED HYDRAULIC PROPERTIES FOR CONSTANT-RATE PUMPING TEST 11

PRELIMINARY DRAFT

Calculation Sheet - Well IR12MW14A

PUMPED WELL: IR12MW14A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 1.2 gpm = 231 ft^3/day

b Saturated thickness = 10.9 ft

Δs Change in residual drawdown = 0.39 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\,Q / 4\,\pi\,\Delta s$

$T = 2.3\,(231) / 4\,\pi\,(0.39)$

T = 110 ft^2/day

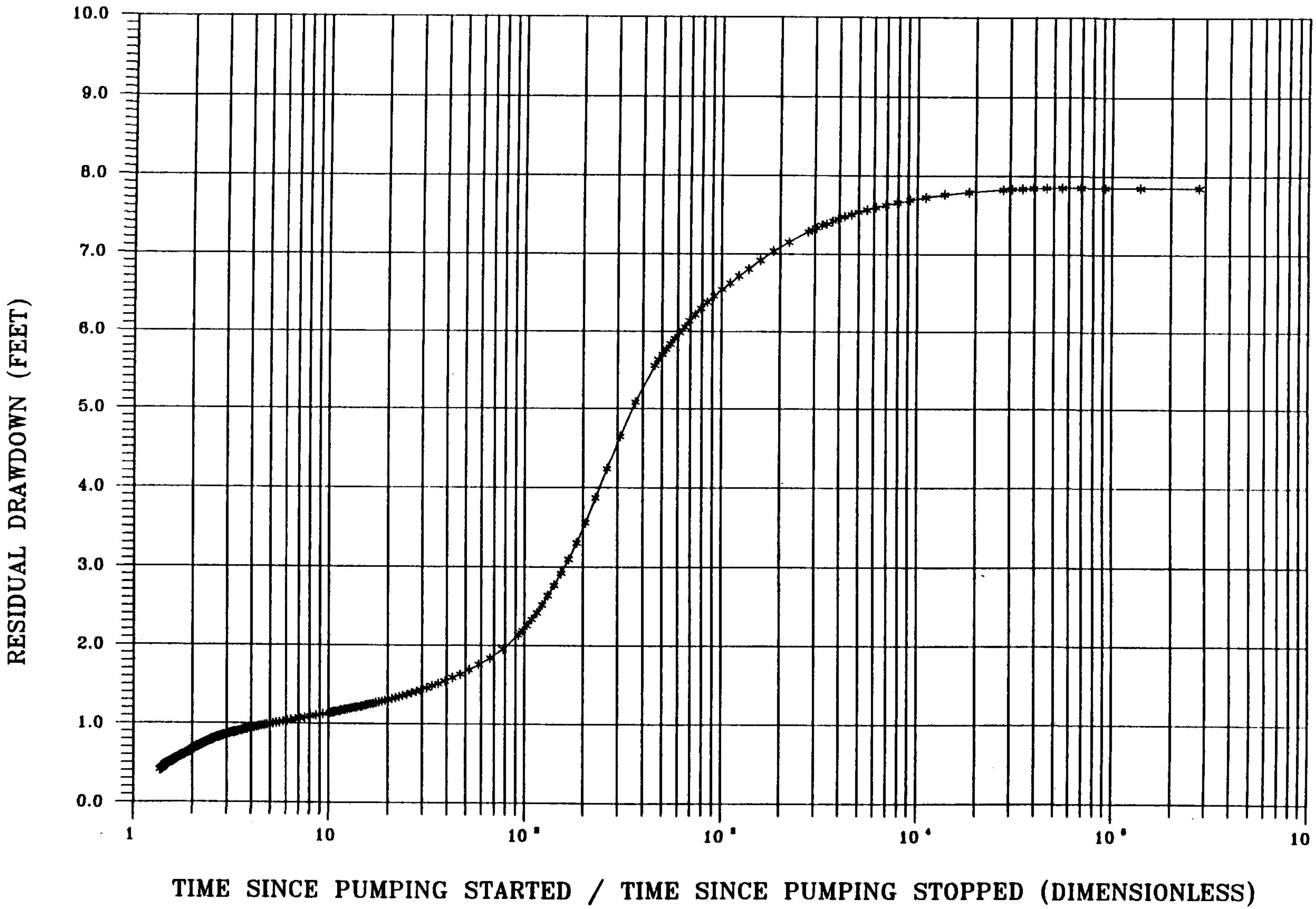
HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (110) / (10.9)$

K = 10 ft/day

RESIDUAL DRAWDOWN
RESIDUSAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR12ME14A
CONSTANT RATE DISCHARGE TEST OF WELL IR12MW14A
HUNTERS POINT ANNEX SITE IR-12



PRELIMINARY DRAFT

Calculation Sheet - Well IR12P14AB

OBSERVATION WELL	IR12P14AB
PUMPED WELL:	IR12MW14A
TYPE OF DATA:	Drawdown early time
ANALYSIS METHOD:	Unconfined Aquifer with Delayed Yield (Neuman, 1975)

Equation Parameters:

Q Constant Discharge rate = 1.2 gpm = 231 ft^3/day

r Radius from pumped well = 39 ft

b Saturated thickness = 9.6 ft

Early time type curve match point:

$U_a = 2.51$ $W(U_a B) = 13.80$ $B = 0.001$

Drawdown (s) = 1 ft Time (t) = 10 min

TRANSMISSIVITY (T):

$T = Q\,W(U_a B)\ /\ 4\ \pi\ s$

$T = (231)\ (13.8)\ /\ 4\ \pi\ (1)$

T = 250 ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T\ /\ b$

$K = (250)\ /\ (9.6)$

K = 26 ft/day

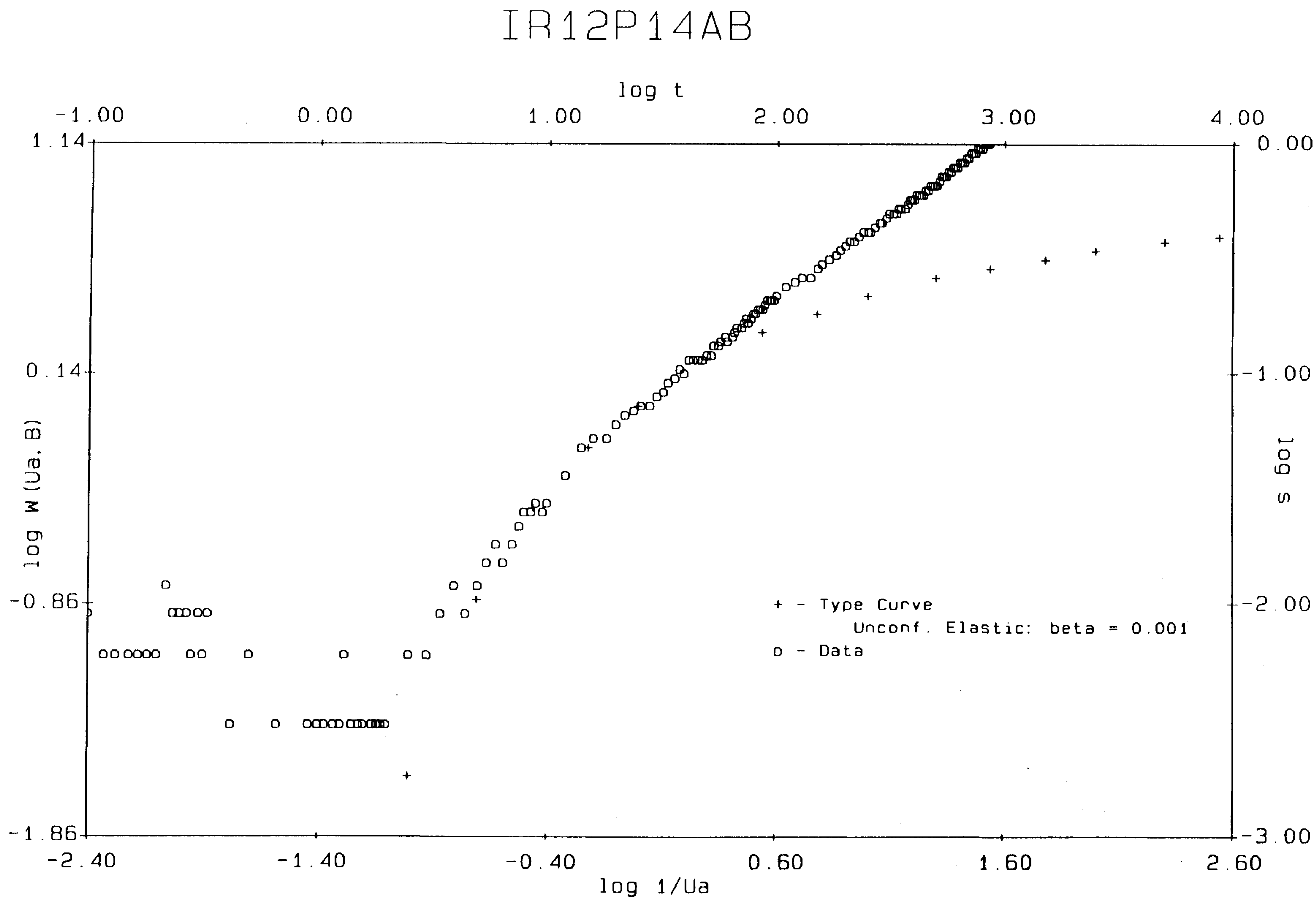
STORATIVITY (S):

$S_s = U_a\ T\ t\ /\ r^2$

$S_s = (2.51)\ (250)\ (10)\ /\ (1{,}440\ \text{min/day})\ (39)^2$

$S_s = 0.003$

PRELIMINARY DRAFT



Calculation Sheet - Well IR12P14AB

PUMPED WELL: IR12MW14A

TYPE OF DATA: Residual drawdown

ANALYSIS METHOD: Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 1.2 gpm = 231 ft^3/day

b Saturated thickness = 9.6 ft

Δs Change in residual drawdown = 0.20 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\,Q\ /\ 4\ \pi\ \Delta s$

$T = 2.3\ (231)\ /\ 4\ \pi\ (0.20)$

$T = 210\ ft^2/day$

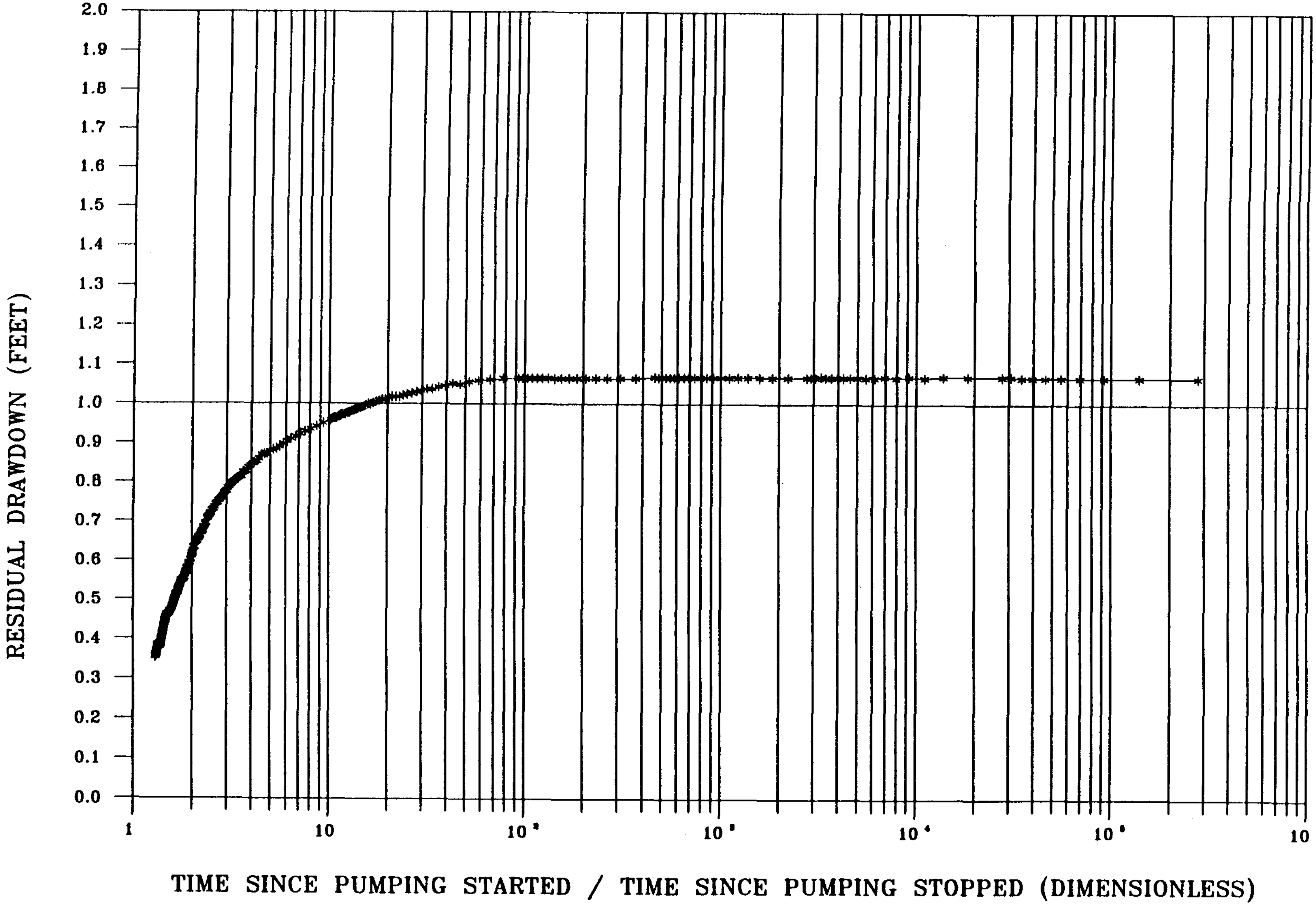
HYDRAULIC CONDUCTIVITY (K):

$K = T\ /\ b$

$K = (210)\ /\ (9.6)$

$K = 22\ ft/day$

RESIDUAL DRAWDOWN
RESIDUAL DRAWDWON VERSUS DIMENSIONLESS TIME, WELL IR12P14AB
CONSTANT RATE DISCHARGE TEST OF WELL IR12MW14A
HUNTERS POINT ANNEX, SITE IR-12



C2-L

MATCHING CURVE AND ESTIMATE HYDRAULIC PROPERTIES FOR CONSTANT-RATE PUMPING TEST 12

Calculation Sheet - Well IR13MW12A

PUMPED WELL:	IR13MW12A
TYPE OF DATA:	Residual drawdown
ANALYSIS METHOD:	Theis Recovery (Theis, 1935)

Equation Parameters:

Q Constant Discharge rate = 5.4 gpm = 1,039 ft^3/day

b Saturated thickness = 12.5 ft

Δs Change in residual drawdown = 0.01 ft per log cycle

TRANSMISSIVITY (T):

$T = 2.3\,Q / 4\,\pi\,\Delta s$

$T = 2.3\,(1{,}039) / 4\,\pi\,(0.01)$

$T = 19{,}000$ ft^2/day

HYDRAULIC CONDUCTIVITY (K):

$K = T / b$

$K = (19{,}000) / (12.5)$

$K = 1{,}520$ ft/day

Continue

RESIDUAL DRAWDOWN
HUNTERS POINT ANNEX SITE IR-13
RESIDUAL DRAWDOWN VERSUS DIMENSIONLESS TIME, WELL IR13MW12A
CONSTANT RATE DISCHARGE TEST OF WELL IR13MW12A